Paper

TRADE JOURNAL

OCT. 19, 1951

HOW CAN YOU GET THE MOST SERVICE FROM MACHINE KNIVES? . . . Page 20

HOW TO DETERMINE THE NUMBER AND SIZE OF MACHINES . . . Page 28

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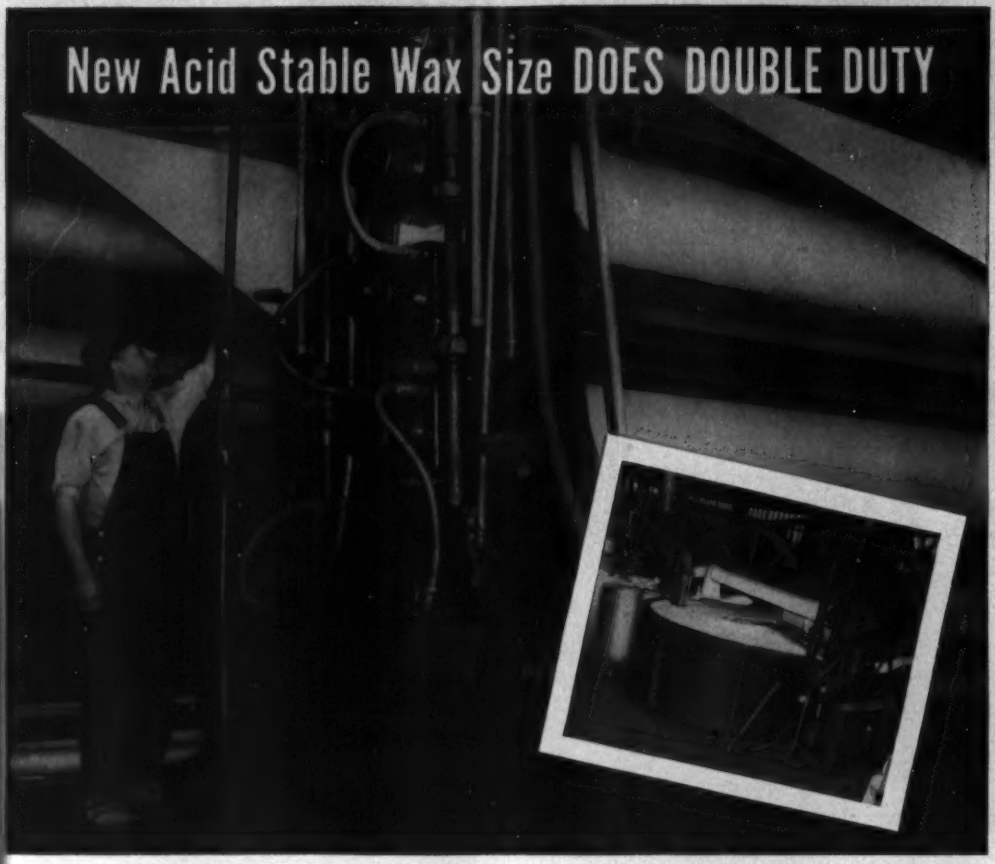

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A single Midwest-Smith Beater will process up to sixty tons or more of pulp per day, at a phenomenal saving in power per ton of stock as compared to any other type of beater, jordan, or disc refiner.

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Paper TRADE JOURNAL

AKP

VOL. 133 OCTOBER 19, 1951 No. 16

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NEXT WEEK

Well-illustrated descriptions of the latest types of mechanical equipment for handling pulp or paper products will be found in "Handling Pulp & Paper Products with Conveyors" by W. R. McNally, Pulp & Paper Industry Engineer, Link Belt Co.

REMEMBER THESE DATES

OCT. 25-26: Technical Assn. of Pulp and Paper Industry, Plastics Conference, State University of New York, College of Forestry, Syracuse, N. Y.

OCT. 29-31: National Foreign Trade Convention, Waldorf Astoria, New York City.

NOV. 26 to DEC. 1: 23rd Exposition of Chemical Industries, Grand Central Palace, New York, N. Y.

DEC. 2-5: American Institute of Chemical Engineers, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

FEB. 18-19: Salesmen's Assn. of the Paper Industry, Annual Meeting and Luncheon, Waldorf-Astoria, New York, N. Y.

FEB. 18-21: Technical Assn. of Pulp and Paper Industry, Annual Meeting, Commodore Hotel, New York, N. Y.

MARCH 16-18: American Institute of Chemical Engineers, Atlanta Biltmore Hotel, Atlanta, Ga.

MARCH 24-26: The National Paper Trade Assn., Annual Meeting, Waldorf-Astoria, New York, N. Y.

MAY 5-9: Third Casting Conference of the Technical Assn., of the Pulp and Paper Industry, at the Sherman Hotel, Chicago, Ill.

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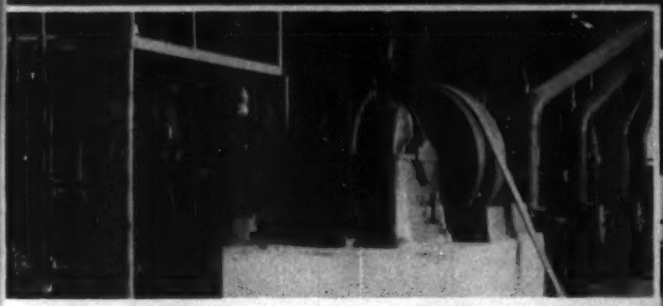

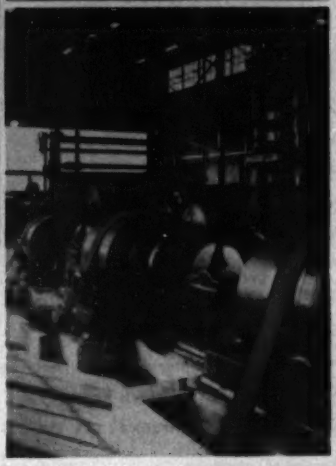

By today's standards a paper machine drive has to be of the right materials, compact, totally enclosed.

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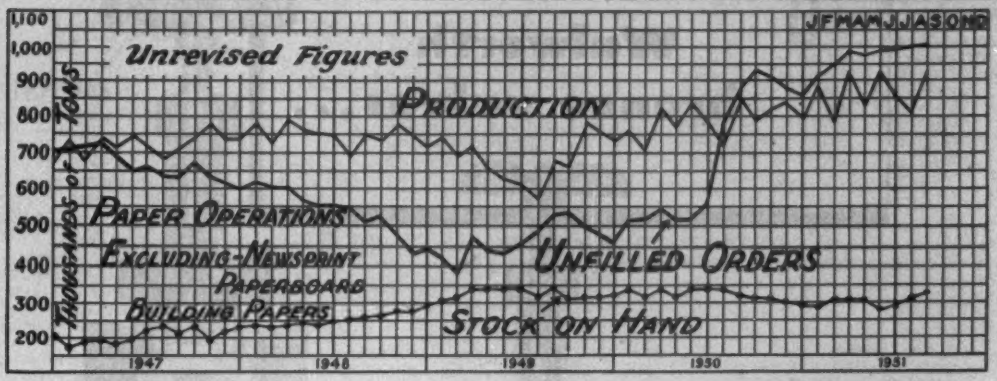
OUR BUSINESS

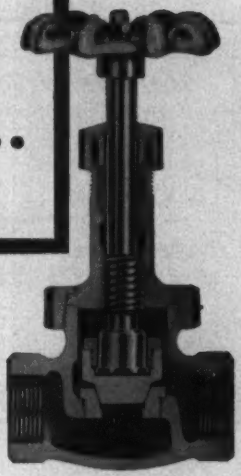


Brief of Important Figures

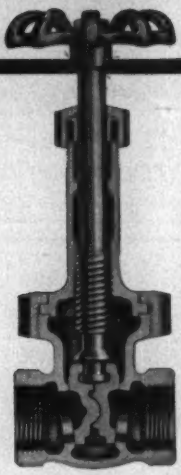
Source	Production	Week Ending Oct. 6, '51	Sept. 8, '51	Oct. 7, '50
APPA	Paper Production Percent Capacity[2]	101.6	78.7	99.9
	Unbl. Kraft Paper Production Percent	99.1	79.8	95.3
NPA	Paperboard Operating Ratio Percent Inch Hours	88	71	100
		Aug. 1951	**July 1951x**	**Aug. 1950**
APPA	Paper Production[6] (Except Newsprint and Building Papers) ....Tons	925,500	808,000	865,000
	New Orders ....Tons	875,000	848,000	979,000
	Unfilled Orders ....Tons	1,001,800	1,035,765	863,500
	Shipments ....Tons	906,000	796,000	873,500
		Sept. 1951	**[4]Aug. 1951**	**Sept. 1950**
NPA	Paperboard Production ....Tons	816,356	1,112,731	877,945
	New Orders ....Tons	825,249	1,081,321	872,012
	Unfilled Orders ....Tons	458,150	470,841	714,877
	Our Customers Activities Index[1]	**Latest Mo.[5]**	**Previous Mo.[5]**	**Year Ago[5]**
FRS	Manufactures Total Index	223	233	207
	Durable Mfg. Index	264	276	237
	Nondurable Mfg. Index	191	197	182
	Chemical Products Index	302	300	259
	Mfg. Food Products Index	177	165	178
	Printing and Publishing Index	159	172	150
ODC	Magazine Advg.-Printer's Ink Index	368	350	316
	Retail Sales Combined Adjusted Index	347.4	342.6	354.7
	Drug Index	236.6	234.9	221.2
	General Merchandise Group Index	329.6	322.2	369.7
	Grocery and Combination Index	446.2	439.4	410.9
	Prices Index			
BLS	Consumers Price Index[1]	185.5	185.2	172.0
	Wholesale all Commodities[2]	179.5	181.8	162.9
	Wholesale Foods[2]	186.0	186.3	171.4
	Commodities other than Farm Products and Foods[2]	168.7	170.6	151.6
	Wholesale Pulp and Paper[2]	197.2	196.2	159.8
	Purchasing Power of Dollar, Consumers Prices[1]	53.9	54.0	58.1
	General Activity Index			
FRS	Mfg. Production-Worker Payroll	429.4	435.7	367.5
	Unemployment Compensation Initial Claims (M)	1,086	1,118	971
	Miscellaneous Carloadings-Thousands of Cars	1,454	1,937	1,433
	Electric Output (Million KW hr.)	35,435	34,966	31,626
PTJ	Average 32 P & P Common Stocks as of Oct. 13	$40.77	$39.96	$34.26

[1] 1935-39=100 Unadjusted Index
[2] 1926=100
[3] New 4-7 day basis.
[4] For Five Weeks.
[5] For details see APPA Monthly Statistical Summary—August 1951 Estimated Figures
[6] Latest Month Available on Request
x Revised figures

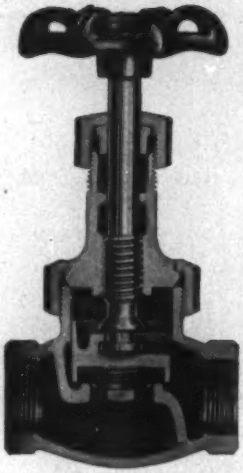
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

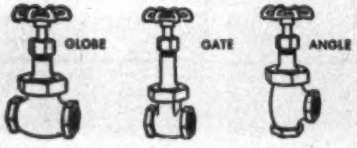
built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:



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Paper TRADE JOURNAL

TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 17, 1951.

Any study of today's market conditions must presuppose a separation between book, writing and other fine papers on one hand, and packaging stuffs on the other.

Notable exception to the packaging classification is unbleached kraft papers which, because of huge unsatisfied demand for wrapping papers, shipping sack and bag stock, are at peak output. Official reports show production ratio-to-capacity at 101.8 for the week ended September 29, and 99.0 for the week ended October 6, 1951.

Overall industry figures for the same weeks stand at 100.3 for the week of September 29 and at 101.6 for the week ended October 6. Like the August gains above July's vacation month, shown in *Table I*, these figures can be misleading. The huge volume of output in Fine Papers (Group 1) overshadows the weakness in Packaging Papers (Group 2). Group 2, however, is the accepted bell-wether of industry trends.

Govt. Buying More Fine Paper

Increased buying by Government agencies is believed to be supporting any lag in civilian demand for Group 1 papers. Also a consideration is that what might have proved to be a danger point in market trends — a wholesale liquidation of the tremendous paper inventories — seems to have been postponed. Consumer demand continues at a fair pace but without pressure for deliveries.

NAPA Reports For October

Continued improvement in the supply-demand ratio is apparent in the Fine Papers market, says the October report of the National Association of Purchasing Agents, which notes that this group has probably felt the effects of reduced demand less than other papers and boards. "Many members of the industry, particularly the non-integrated section in the rag-content grades, have developed specialized industrial and other outlets that insulate them to an important degree from their former complete dependence on the fortunes of the graphic arts and related converting industries. In these days of fantastically high breakeven points, necessitating practically maximum production to insure profits, potential customers offering a steady and continuing outlet for annual tonnage find their wants very sympathetically dealt with." (ED. NOTE: Such large volumes of rag-content papers are required for engineering purposes that the mills find it necessary to allocate their output.)

TABLE I
August Paper Production

	Production Tons	% Changes in Daily Avg. Production: August 1951 Compared with July 1951	August 1951 Compared with August 1950
A. Printing Papers	314,000	+14.3	+ 9.7
B. Fine Papers	121,000	+17.0	+ 8.7
C. Coarse Papers	305,000	+ 1.8	+ 6.5
D. Tissue Papers	140,000	+ 9.3	+18.8
E. Miscellaneous Papers	45,500	+11.6	+28.3
F. Total, Groups A-E	925,500	+ 9.3	+10.5
Total Paper, Newsprint, Building Paper Paperboard, and Building Board	2,295,000		

Source: APPA Monthly Statistical Summary.
Aug. 1951 had more working days than July and the same number as Aug. 1950.

Packaging Papers and Boards Hit

There are no two ways about it: soft goods (nondurables) buying is down to a point where recessive tendencies are believed apparent. The Fall pickup did not develop, retail buying is off from last year's pre-Christmas and post-Korean buying lull; and consumer spending is down. Unemployment, already a factor in industrial areas, is due for a sharp increase as a result of new cuts in automobile production. According to the Acting Director of the Michigan Employment Security Commission, the rise in Detroit's unemployed will increase from September's 88,000 to approximately 134,000 by next March. Director Horton's estimate followed the announced cut in car production to 950,000 for the first three months of 1952. "It is anticipated that there will be nothing to fill the gap between the curtailment of civilian production and the eventual upswing on the defense output," Mr. Horton said, giving as his opinion that the guns-and-butter economy would not be in balance for many months, and that volume production of defense goods is still in the planning stage.

Bearish Tendencies Grow

The three bears and their families have taken up an abode in segments of the packaging and board markets. The atmosphere is depressing. Percent of mill activity stood at 88 percent for the week ended October 6, a steady drop from the year's peak of 105. Southern container production is holding industry figures to this level. Northern and midwestern mills report sharp cutbacks, or complete shutdowns.

Coarse paper merchants feel the drop in board demand is in part due to the firm price of boards. In their opinion, this market should be reflecting the low prices of waste papers and responding to supply and demand conditions.

"The market is being artifically controlled on many items by Government edicts," a leading New York wholesaler said last week. "It is not being allowed to follow the normal supply-demand pattern. Normally, a falling off in demand such as hit the boards market would send prices tumbling. Today—with perhaps the biggest board producer in the East shut down since August 1; when there still doesn't seem to be enough business to keep other mills running full; one would assume on the basis of precedent that prices of boards would come down. Nothing of the sort has happened, even though there are indications that demand during the coming months is not going to be any too heavy. Industrial demand for general merchandise is not heavy. Soft and hard goods are equally slow."

Board Price Ceilings Discussed

From the mill viewpoint, board prices are based on the tremendous stocks of waste papers bought at high prices; also on the belief that the current lull might quickly be righted by Defense orders, and by the possible release of tailored ceiling prices by OPS.

Though prices for various segments of the board industry are being undertaken by OPS and its Industry Advisory Committee, it now seems unlikely that uniform ceilings will be set for more than a few special paperboard items because of varying production and marketing conditions.

In the opinion of one wit, controls will be necessary to hold the floor rather than the ceiling.

Waste Paper Stocks At Peak

Taken as a sample of waste paper stocks across the nation, Eastern mills for October's first week had on hand 68 percent more of all grades than a year ago. Mixed paper stocks were up 89 percent, *news* 154 percent, old corrugated containers 53 percent, high grades 16 percent. The Eastern Conservation Committee reported that one-third of the waste paper consumers continued to add slightly paperstock to their inventories during the week, but stressed the effort to improve the quality of stock accepted.

Gloom in the waste paper market deepens.

—E.P.N.

Paperboard Production (Tons)*

	Oct. 6 1951	Sept. 29 1951	Oct. 7 1950
Production	215,312	218,174	231,663
New Orders	237,590	206,321	281,869
Unfilled Orders	528,883	458,150	763,679
% of Activity	88	90	100

* Source: NPA.

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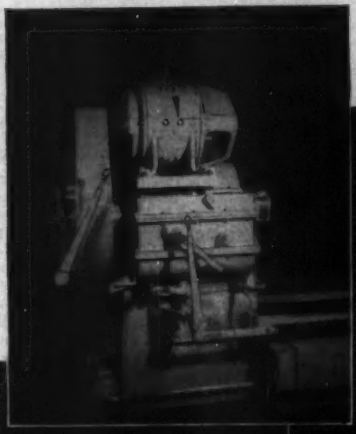

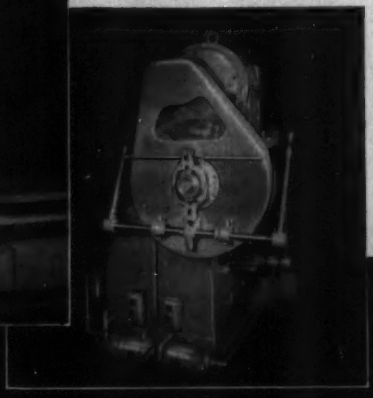

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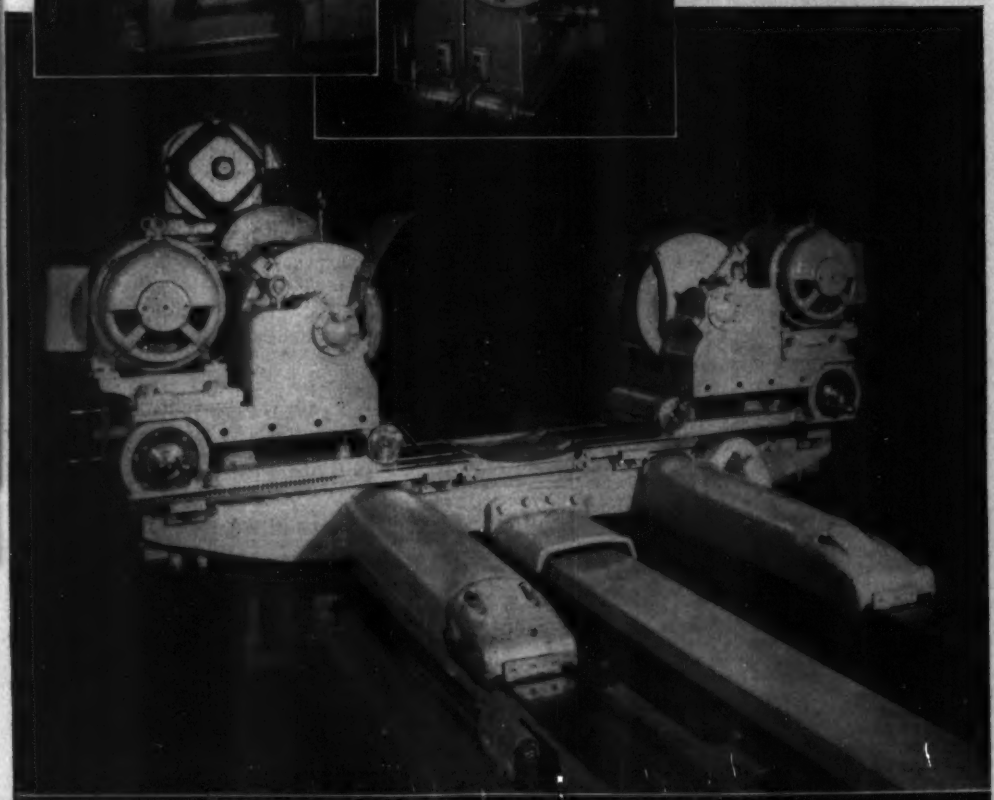

LOBDELL UNITED COMPANY

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News of the Week

Paper TRADE JOURNAL

BOWATER IMPROVEMENT PLAN

OTTAWA — Bowater's Newfoundland Pulp and Paper Mills Ltd., at Corner Brook, Newfoundland, will be the scene of an expansion program involving an estimated expenditure over a period of a year of approximately $10 million in order to increase production of newsprint and sulphite pulp.

This new program will call for the installation of one or two new digesters as well as an appropriate number of additional screens; a completely redesigned and reconstructed stock storage and blending plant and equipment; a new diesel-electric generating set of some 6,000 kw. to be installed; new office to relieve congestion in present quarters.

BROMPTON PLANS EXPANSION

St. Lawrence Corp.'s East Angus, Que., mills will be expanded by large-scale improvements which are estimated to cost about $7 million. The program is scheduled to be completed by the end of 1953. The mills are owned and operated by St. Lawrence Corp.'s subsidiary, Brompton Pulp and Paper Co., whose present annual capacity includes 45,000 tons of kraft paper, material and board; 9,000 tons of boxboard; 1,500 tons of white paper and towelling, and 8,500 tons of sulphate pulp. The plans include increased kraft production.

$235,000,000 FOR SOUTHERN MILL

The Federal Reserve Bank of Atlanta, Ga., the Sixth District of the United States, estimates that $235 million will be spent on the new pulp and paper mills now being built or to be built in Alabama, Florida, Georgia, Louisiana, Mississippi and Tennessee.

"Although a slackening in demand for paper products is being reflected in the current employment figures," says the Reserve Bank's recent bulletin, "the productive capacity of the paper and allied products industry is expanding so rapidly that the long-term employment trend will undoubtedly be upward."

As recently as 1947, the Reserve Bank says, of the total of manufacturing workers in the six states of the district 4.4 percent were employed in pulp and paper establishments; by July of this year the pulp and paper workers' percentage had risen to 5.6 of total manufacturing employment. The plants of these six states had 57,000 workers on their payrolls in July of this year. Employment in the paper industry in the district is 22 percent higher than in 1949, whereas general manufacturing employment has risen only about 8 percent. The largest number of employes are found in Louisiana, followed by Georgia, Florida, Alabama, Mississippi and Tennessee in that order. These employes do not include workers in the woods or in other activities that supply raw materials to the mills.

ANOTHER WOOD CHIP PLANT

PORTLAND, Ore. — A new plant for the production of wood chips for pulp has started operations at the C. D. Johnson lumber mill at Toledo, Ore., according to announcement by Robert F. Johnson, president of the C. D. Johnson Lumber Co. The chipping plant is a new division of the Toledo lumber firm operation. Fir, hemlock and spruce will be utilized to produce the raw material used in the making of newsprint.

$50 MILLION LOSS DUE TO FOREST CLOSURE

Loss due to the forest closure in British Columbia is estimated at $50 million in wages and timber, while the cost of fighting fires in British Columbia during the closure, which lasted from July 12 until the end of September, is estimated at over $1 million.

In the Vancouver forest district alone, the cost of fighting fires was over $300,000.

NEW INTERNATIONAL LAB.

MOBILE, Ala. — International Paper Co. has started construction of a research department building for its Southern Kraft Division.

Heretofore, the company has concentrated its formal research at Hawkesbury, Ontario, Canada, although some research has been carried on at Southern Kraft headquarters at Mobile. The research building is expected to be completed early next year.

CANADIAN NEWSPRINT MILL TO SERVE EUROPEAN MARKET

QUEBEC, Que. — Establishment of a newsprint plant on the St. Lawrence north shore, exclusively for European consumers, would be welcomed by the Quebec government.

Premier Duplessis said at his press conference that such a plan would help overcome the world newsprint shortage.

Canadian and European industrialists are interested in the idea at the moment, the Premier stated.

CENTRAL PAPER EXPANDS

Central Paper Co., Menasha, Wis., manufacturers of gummed tape, announce the near-completion of their new factory addition.

The new building adjoins the present plant and will make possible straight-line production from the gum-

$1000 University of Maine Scholarship Winners

Nine University of Maine students have been awarded scholarship grants by the University of Maine Pulp and Paper Foundation. They are, left to right, Donald R. MacKinnon, Orono; Robert N. Zabo, Bangor; Roy P. Webber, Portland; Dwight D. Frye, Bucksport; James E. Ayer, Bangor; Frank A. Butler, Verona, N. J.; John M. McClure, Glendale, Calif.; William E. Pomeroy, Bath; and Robert E. Perry, South Freeport.

ming machines through packing and shipping. Before being installed in their new locations, Central's gumming machines are being revamped to increase production speed.

The new second floor will be used to house the greatly expanded printing equipment which Central has recently acquired. Plans are to move into the new quarters before the first of the year, according to Stuart Thompson, sales manager of the company.

REBUILD MARINETTE MACHINE

SOUTH GLENS FALLS, N. Y.—A complete rebuilding job on the Number One paper machine in the South Glens Falls plant of the Marinette Paper Co. is expected to increase production of Soft-Weve tissues. Work was done under supervision of ten engineers from the Mechanical Development Department of the Chester plant.

The Number One machine, which was built prior to 1921, was rebuilt almost entirely both inside and out, after engineers had made some 600 drawings since the first of the year. After a month of reconstruction, the machine went back into operation last month with higher operating speed and increased paper quality.

Among the many changes and improvements built into the machine were a new fourdrinier, new headbox, new calendar, new stock system, new head supply system and new reel. The steam system was altered and new unwinding stacks and rewinder for two-play tissue were added.

PEOPLE

RONALD HYNES, president of Newton Falls Paper Co., has been honored by a citation from St. Lawrence University. The award which is made annually to outstanding citizens, reads:

"Ronald William Hynes: Worthy son of the north country; president and treasurer of the Newton Falls Paper mill; banker; erstwhile chairman of the New York and Canadian Division of the American Pulp and Paper Mill Superintendents Assn.; developer and perfecter of a de-inking process for the re-use of old magazines in place of new pulp, contributing thus mightily to the muniments with which a free press may continue to battle for free peoples everywhere; tireless in his efforts toward better working and living conditions for his employes, and toward enhancement of the spirit of loyalty between management and labor; exemplar of one of the finest traditions of America, the tradition of rise from modest beginnings through personal merit and diligence to respected eminence in his profession and to the enduring esteem of his fellow north countrymen.

"It is the privilege of St. Lawrence University to cite you for outstanding achievement in industry in the north country."

PAUL W. BARTHOLOMEW has been named technical director, Paper Division, of the Minnesota and Ontario Paper Co., International Falls, Minn.

Mr. Bartholomew joined Mando at its Minneapolis headquarters two years ago as assistant paper sales manager after nineteen years previous experience with the Hawthorne Paper Co., Kalamazoo, Mich., and the Hercules Powder Co., Wilmington, Del.

As technical director, Mr. Bartholomew will be responsible for adherence to quality standards in the manufacture of all paper products and in the use of all raw materials, except pulpwood, by Mando's International Falls, Minnesota Paper Division. Collateral responsibilities will include supervision of inspection and paper testing and mill control laboratory. He will also have to do with the development and improvement of present and new grades of paper.

CHANDLER H. JONES has been named sales manager of National Container Corp.'s corrugated box plant in Dallas, Texas.

The company is now building a one million dollar corrugated box plant in Dallas to meet expanding demand for shipping containers in the Southwest.

Mr. Jones, with many year's experience in the industry, will head National Container's Southwest sales operations.

LAWRENCE F. DIXON has been elected a vice-president of the Ecusta Paper Corp.

Mr. Dixon, recently appointed general manager of the Ecusta paper division of Olin Industries, Inc., has been with Ecusta since 1935. Since the opening of the Ecusta plant in 1939, he has been in charge of the Central Fibre Corp. and the California Central Fibre Corp. through which Ecusta secures its flax straw.

REINHOLDT PETERSEN has been appointed Ohio Regional sales manager of River Raisin Paper Co. with headquarters at the company's plant at 10,200 Miles Avenue, Cleveland, Ohio. LAWRENCE P. JONES has been named Eastern Regional sales manager with headquarters at the company's plant at Washington, Pa.; ROY A. SCHELLHOUS as Michigan Regional sales manager with headquarters at 303-305 Capitol Theatre Building, Detroit, Mich.; and JOHN E. TRANT as Illinois Regional sales manager with headquarters at 308 W. Washington Street, Room 1311, Chicago, Ill.

PAUL B. FOWLER, sales engineer for E. D. Jones & Sons Co., is recovering from a recent operation at Cooley-Dickinson Hospital, Northampton, Mass.

S. HARLEY JONES, president of E. D. Jones & Sons Co., is recovering from an emergency appendectomy at Frisbie Memorial Hospital, Rochester, N. Y. He was taken sick unexpectedly while on a hunting trip.

ASSOCIATIONS

MIAMI VALLEY MEET OCT. 25

The Miami Valley Division of The American Pulp and Paper Mill Superintendents Assn. will hold a dinner meeting on October 25 at the Manchester Hotel, Middletown, Ohio. The meeting is to feature a discussion on the application of nickel alloys and their uses in the paper industry. Two participants in this discussion will be Charles J. Brown and Richard Faher, both of The International Nickel Co.

Another highlight of the meeting will be the presentation of a certificate of life membership in the association to John H. Stansell, now retired but for many years associated with the paper industry of the Miami Valley.

NEW AFPI FIELD OFFICE

WASHINGTON, D. C.—A new field office was established this week by American Forest Products Industries, with Ben G. Rhodes in charge.

Mr. Rhodes leaves his post as farm editor of *The Raleigh Register*, Beckley, W. Va., to become AFPI's central states manager. His headquarters will be in the West Virginia Building, Huntington, W. Va.

MICH. SUPTS. ELECT OFFICERS

Richard H. Peeters, St. Regis Paper Co., Kalamazoo, Mich., was elected chairman of the Michigan Division of The American Pulp and Paper Mill Superintendents Assn. for 1951-1952 at the September 20 dinner meeting of the Division, held at Hotel Harris, Kalamazoo, Mich. Elected along with Mr. Peeters were: Harvey W. Hartman, American Box Board Co., Grand Rapids, first vice-chairman; Leo H. Mimms, Kalamazoo Paper Co., second vice-chairman; and Dr. Alfred H. Nadelman, Western Michigan College, secretary-treasurer. Howard H. Vanderberg, A. E. Staley Mfg. Co., also was elected by the Division from the Industrial Affiliates group as its Affiliates representative.

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One of the high spots of the evening program was the presentation of a life membership in the National Association to Otto Fischer, now retired but for many years associated with Bryant Paper Co., Kalamazoo. This presentation was made by O. W. Callighan, Edgar Bros. Co., retiring chairman of the Division. Mr. Callighan also was the recipient of a certificate. It was a certificate of merit awarded him as the outgoing chairman by Ray Barton, past president and trustee of the national association. In making this latter presentation, Mr. Barton thanked Mr. Callighan for his devoted and eminently successful work for the Division as well as for the association as a whole.

Lester J. Smith, Gould Paper Co., Lyons Falls, N. Y., was guest speaker of the evening.

L. to R. O. W. Callighan, Edgar Brothers Co., retiring Chairman of the Division; Otto F. Fisher, retired and recipient of life membership certificate in Association; Glen Sutton, Sutherland Paper Co., President of the National Association; and Raymond L. Barton, Michigan Paper Co., trustee of the National Association.

Injuries and Accident Causes in the Manufacture of Pulp & Paper

Sharply declining accident rates in the pulp and paper industry during the post-war period are highlighted in a forthcoming report of the U. S. Department of Labor's Bureau of Labor Statistics.

This report, covering a comprehensive study of work-injury experience in the industry, indicates that the high point in injury frequency for pulp and paper operations was reached in 1944. In that year the injury-frequency rate for the industry was 29.2, some 59 percent higher than the all-manufacturing average. Five years later, in 1949, the industry rate was down to 16.4, at which point it was only 9 percent above the all-manufacturing average.

Approximately 7,900 disabling injuries occurred in pulp and paper manufacturing during 1949. The economic loss, including direct and indirect costs, resulting from these injuries, is estimated at about $25 million.

Paper-making plants generally had lower injury rates than those exclusively engaged in making pulp. The best group rate in 1948 was 11.8 for building-paper plants. For pulp plants the corresponding average was 26.7.

Comparisons among the production departments of the reporting plants indicate that injuries occur most frequently in the woodyards, which had an average frequency rate of 41.2. Woodrooms, paper-machine rooms, rag-shredding departments, groundwood mills, sulfite mills, and beater rooms all had rates of over 20. Sulfate mills, soda mills, wet rooms, bleaching departments, and converting departments had rates ranging between 10 and 20. Rag mills had the lowest production department rate, 6.8.

The records show a definite inverse relationship between the frequency-rate level and plant size with the first significant break occurring at about the 250-employee level. Up to the 250-employee level, plant size variations appear to have little bearing upon the occurrence of injuries.

An unusually high proportion of the plants in the pulp and paper industry maintain organized safety programs. Over 75 percent of the 534 plants surveyed reported having some form of safety program. There seemed to be a significant relationship between a plant's injury record and the presence of a safety engineer. The development of in-plant safety programs and the maintenance of medical or first-aid programs both seem to be closely related to plant-size variations.

About a fourth of all the recorded injuries resulted from contact with machines; flying particles produced 12 percent; hand tools 9 percent; pulpwood logs 7 percent; working surfaces 6 percent; paper 6 percent; and chemicals 4 percent.

Over 37 percent of the recorded accidents were cases in which workers were struck by moving, falling, or flying objects. Almost 14 percent of the injuries resulted from workers bumping into or striking against fixed objects. Another 14 percent resulted from workers getting caught in or between objects. Falls were responsible for 10 percent of the injuries, overexertion for 9 percent, and slips or stumbles for 4 percent.

Slippery working surfaces, inadequately guarded machinery, exposure to hot or toxic materials, and improperly piled materials were the physical causes of many accidents. Manual handling of heavy materials and the absence of personal protective devices were also prominent accident causes.

Outstanding among the unsafe acts which resulted in accidents were: The misuse of hand tools, improper material handling, inattention to footing or surroundings, improper piling of materials, failure to warn others when starting machinery, and failure to wear goggles where required.

Accident-prevention suggestions, prepared by the Bureau of Labor Standards, indicate that most accidents in the industry could be prevented through the application of very simple precautions.

UNION BAG GRANTS INCREASE

HUDSON FALLS, N. Y. — About 350 employes of the Fenimore plant of the Union Bag and Paper Corp. have been granted a cost-of-living wage increase of 2.2 percent following a wage conference October 8 in the court house at Hudson Falls.

The increase, announced after a meeting between union and corporation officials, will be based on average hourly earnings paid on the payday nearest to January 25, 1951. The increase is retroactive to October 1.

The pay boost was made possible by a recent ruling of the Wage Stabilization Board allowing companies to increase wages in an amount equal to the increase in cost of living for the six month period from January 25 to July 25, 1951.

PLAN DIXIE CUP ADDITION

Dixie Cup Co. plans construction of a $250,000 addition to the plant in Brampton, Ont., expected to be completed by Spring.

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WHO'S WHO ISSUE NOVEMBER 30th, 1951

GOVERNMENT GOSPEL

RFC To Approve Expansion Loans

WASHINGTON, D.C.—Reconstruction Finance Corporation has taken over from Defense Production Administration authority to approve loans for industrial expansion for defense.

Certificates of necessity of each loan from Defense Plant Administration are now required for all domestic loans under Sec. 302 of the Defense Production Act, which covers loans made where neither private funds nor regular RFC funds are available for industrial expansion.

All loan applications for domestic facilities should be filed with RFC field offices throughout the country, it was stated.

Rule on Steel Distribution

Steel producers will be required to ship a minimum of 100 percent of average monthly base period tonnages to warehouse distributors on and after January 1, 1952, instead of 85 percent as of now.

Ask Continued Newsprint Shipments to Friendly Foreign Nations

The Newspaper Industry Advisory Committee today recommended to the NPA that there should not be any change in the system of emergency allocations of newsprint to friendly foreign governments.

NPA told the committee that during the first eight months of this year, approximately 30,000 tons of newsprint had been allocated to 15 foreign governments to meet emergency publishing requirements.

NPA reported to the committee on the general newsprint outlook. Because of power shortages in the Northwest, the paper manufacturing situation there is critical and the same is true of certain areas of the Southwest. However, the overall paper situation, while still critical for the coming year, promises improvement. Unless there is some sudden and unforeseen change, publishers should be in an adequate position without recourse to government regulations.

Ask Metal Conservation Order

To conserve critical materials and accelerate production for defense, the Valves and Pipe Fittings Industry Advisory Committee at a meeting with the NPA, recommended that a proposed metal conservation order be put into effect as soon as possible. The order would provide for standardization and specification controls.

Some members said that without additional allotments of controlled materials they can not fulfill present commitments. The consensus was that the industry is depleting its inventory of raw materials.

Canadian Woodpulp Exports Increase

OTTAWA—Exports of woodpulp from Canada are continuing to rise. Canadian Government announces that such shipments increased to $34,286,000 in July this year compared with $14,734,000 a year ago in July and totaled $197,646,000 in first seven months of this year as against $106,724,000 last year in corresponding period.

Newsprint exports increased to $51,344,000 during July compared with $39,192,000 a year ago July and advanced to a total of $299,846,000 in first seven months compared with $274,656,000 last year. Other paper exports advanced to $3,329,000 in July against $1,380,000 a year ago, and totaled $20,755,000 in first seven months against $8,726,000 last year in same period.

Imports of paper into Canada amounted to $2,707,000 during July as against $1,840,000 a year ago July and totaled $19,756,000 in first seven months of this year compared with $12,813,000 last year in similar period.

Adjust Inter-Plant Wage Inequities

WASHINGTON, D. C. — The Wage Stabilization Board of Labor Department has adopted an inter-plant equity policy under which wage rates will be adjusted as between lower-paying and firms with higher wage levels, it was announced by that agency.

Under this policy firms with a low rate will be allowed to petition the Board for approval to bring wages up to stabilized levels when necessary to correct proven inequities.

More than 1,000 cases in the Wage Board's backlog, it was reported, involve inter-plant inequity, and action has awaited adoption of a policy, now announced. However, it was said, the inequity policy will establish standards for distinguishing between normal wage differentials which are to remain unaltered, and such differentials "which may be narrowed or eliminated under a sound wage stabilization program."

Newsprint Mfrs. May Get More Sulfur

WASHINGTON, D. C.—Increased allocations of sulfur to newsprint manufacturers would be required under a bill, H.R. 5451, introduced in the House by Rep. McDonough, Rep., Calif.

The allocation would be raised to 150 percent in any calendar quarter, of the quantity used by the manufacturer in the corresponding quarter of 1950. The current NPA restricting order would be held in abeyance meanwhile.

Another bill, H.R. 5575, by Rep. Roberts, Dem., of Alabama, would authorize loans by the RFC for construction of newsprint plants.

Paper and Printing Dividends

WASHINGTON, D. C. — Publicly reported cash dividend payments in the paper and printing industries showed a combined total of $6 million in August, and $92,900,000 in the first eight months of 1951, compared with $6,100,000 and $79,800,000, for the corresponding 1950 periods, the Commerce Department reported this week. Payments were not shown separately for the two industries.

Brown-Outs Possible?

WASHINGTON, D.C.—Currently, government agencies are giving the public a dark outlook on national power supply in the coming months, with emphasis on the Northwest particularly.

Power shortages in that area were blamed last week for a critical paper manufacturing situation there, in an NPA report to industry advisory representatives. At the same time Secretary of Interior Chapman was warning, in a talk to newsmen here, that an electric power shortage was imminent for the whole country, and one that will be worse than at any stage of World War II.

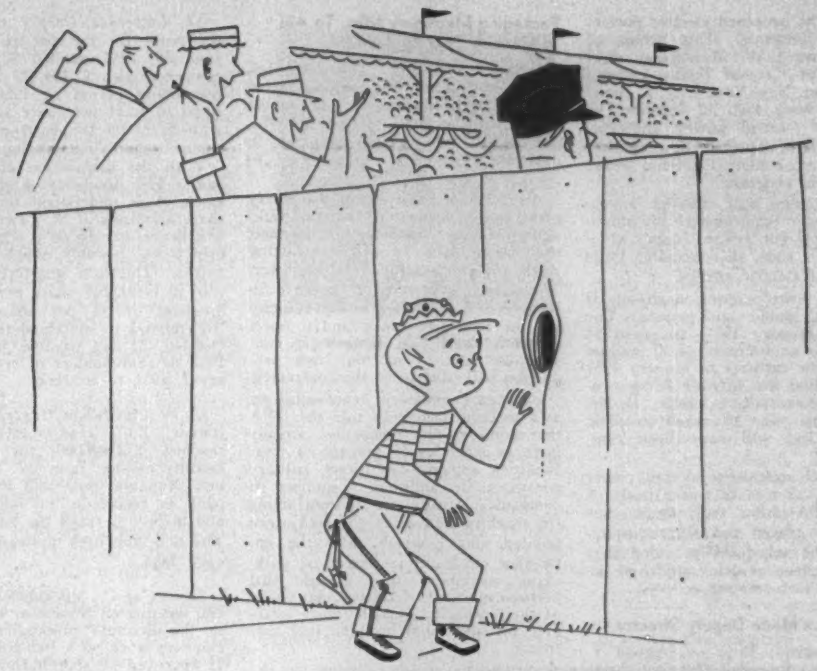
Mr. Chapman said material requirements for the necessary expansion of facilities have been such that in the face of restrictions now in effect, the expansion program has not been able to maintain scheduled progress.

Without minimizing the Northwestern situation, there was evident in some quarters, however, a disposition to make Mr. Chapman prove his case, nationally speaking. The Interior Department is currently seeking Congressional approval for construction of eight fuel-burning electric generating plants in the Pacific Northwest. A House public works committee was expected this week to report out H.R. 4963, which would furnish such authority.

A committee minority has adversely commented on the proposal, however. Rep. George A. Dandero, Rep. Mich., as spokesman for this group raised a number of objections, among them, a citation of testimony during hearings that the government plants would require from a year to 18 months longer to put in operation than would non-Federal hydroelectric plants in the same area, construction of which, it is alleged by the group, has been "blocked" by Interior.

The minority report also questions whether source of fuel for the proposed plants is available; it discounts a proposal to use timber waste, among other fuels, and points out that practical considerations leave only oil as fuel, at a time when Western reserves are already under heavy pressure for defense and vital uses.

While these exchanges were taking place, Defense Production Administration appointed a committee of public utilities representatives to review defense electric power requirements and



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advise on the proposed electric power expansion program. This group, of which Edward W. Morehouse, vice-president of General Public Utilities Corporation, New York City, is chairman, will work with the Interior Department's electric power and fuel agencies. It is expected the committee will soon recommend a defense power construction program.

The program will consider among others, power requirements for aluminum, magnesium, refined copper, chlorine, caustic soda, all demanding large amounts of electric energy.

A large power expansion already is under way, public and private. The total for January 1951–January 1954 amounts to an increase of 27 million kw. over the capacity in January 1951 of 70 million kw. already being produced, or potentially available. By the end of this year expansion totaling 7,700,000 kw. will have been completed.

The pinch extends to electric power equipment, as well as power itself. A recent NPA order will permit new orders for power and electric equipment to be scheduled provided they do not displace or delay approved delivery dates of existing orders.

O. V. Tracy Made Deputy Director

WASHINGTON, D. C. — Osgood V. Tracy, Esso Standard Oil Co. official, has been appointed deputy director of the chemical division of NPA.

Mr. Tracy is on leave as general manager of the Chemical Products Department of his company, and will aid the chemical industry in meeting production goals, and in distribution of scarce chemicals.

Synthetic Dye Production

WASHINGTON, D. C. — Synthetic organic chemical production in July showed the following for commercial concentrations of dyes; all in pounds — based on Tariff Commission data this week:

Chrome blue black, 119,602 against 151,611 in June; direct black, 346,705 against 648,236; naphthol, June only shown, 111,772.

Peacock blue lakes produced for the two months was respectively 169,687 against the revised June production of 302,415 pounds.

New Electric Power Station

WASHINGTON, D. C.—Electric power production has started at a new station at St. Marys Falls, Sault Ste. Marie, Mich. The station is Army Engineer-constructed.

One unit of 4,800 kw. went into production October 10, with additional units to be installed in the next several months. The rated total capacity will be 16,400 kw. and will be made available for public and private power needs in the immediate area, it was stated.

Packaging Machinery Mfrs. To Aid In Machine Tool Production

WASHINGTON, D. C.—The packaging-machinery industry has been appraised that material allocations will be reduced for the first quarter of 1952, due to the very serious situation in controlled materials, according to NPA.

An NPA metal-working machinery group has recommended that the packaging machinery industry take up their production slack by sub-contracting work for the machine tool industry. The latter, according to reports to NPA, will be operating at top capacity for the next two years, and to meet demands already on its books, a considerable part of machine tool production will have to be sub-contracted.

Packaging industry representatives at a meeting last week told the NPA that some of its companies already have as much as 50 percent of their facilities engaged on direct military contracts. In addition, a number of companies already are subcontracting for machine tool firms, the spokesmen pointed out; however, with the impending cut-backs in output of packaging machinery, they thought that perhaps upwards of 200,000 man-hours of their capacity could be made available for additional machine tool contracts.

Multiwall Bags For Indo-China

WASHINGTON, D. C. — Multiwall kraft paper shipping sacks totaling $150,000 in cost, were included in ECA procurement authorizations announced for Indo-China.

FINANCIAL

Howard Smith Paper Mills, Ltd.'s new common stock was oversubscribed in the ratio of about two for one. The offer was of 268,656 shares of new common to shareholders at $23 per share on the basis of one share for each five held after giving effect to the recent four-for-one split.

Bathurst Power and Paper Co., Ltd., has declared a dividend of 75c on Class "A" stock and another dividend of 25c on Class "B" stock, both payable December 1 to stockholders of record November 1.

St. Lawrence Corp., Ltd., has declared a special dividend of $1 on common, payable November 1 to stockholders of record October 22 and another dividend of 50c on common, payable January 15 to stockholders of record January 2.

Rolland Paper Co., Ltd. has declared a dividend of 15c and extra 25c on common stock, payable December 1 to shareholders of record November 15, and another dividend of $1.06¼ on preferred stock, payable December 15 to shareholders of record November 30.

St. Lawrence Corp.'s consolidated net profit for the six months ended June 30, 1951 totalled $3,569,685 as compared with $3,194,522 in the corresponding period of 1950. This is equal to $3.24 per share as compared with $2.90 on the basis of 1,102,715 common shares outstanding.

With the declaration of the company's first dividends on the common stock, it is understood that common share dividends of St. Lawrence Corp. will henceforth be on a regular quarterly basis, possibly supplemented by extras. The first quarterly dividend was 50 cents per share and a special dividend of $1 per share, payable November 1 to shareholders of record October 22 and payable January 15, 1952 to shareholders of record January 2, 1951 respectively.

H. R. MacMillian Export Co., Vancouver, B.C., reports net earnings reached $12,868,000 for the nine months ending June 30, 1951. The new Nanaimo pulp mill of the company is reportedly in full operation and helped to reach the net earnings. The new mill uses millwaste and salvage logs.

Dixie Cup Co. stockholders at a special meeting on November 15 will vote on the directors' proposal to split the common stock on a two-for-one basis. If approved by shareholders, the split will become effective about November 16 and new certificates for the split stock will be mailed soon thereafter.

Howard Smith Paper Mills Ltd. has been granted supplementary letters patent by the Secretary of State of Canada for the purpose of altering the capital stock of the company so that it now consists of 200,000 $2 cumulative redeemable preferred shares of the par value of $50 each and 2,500,000 common shares without nominal or par value.

Hollingsworth & Whitney Co. has registered 100,000 shares of its no par common stock with the SEC. The stock will be offered publicly through an underwriting group headed by Paine, Webber, Jackson & Curtis and Harriman Ripley & Co., Inc. The offering price and underwriting terms are to be supplied by amendment.

NEW TUG FOR GREAT LAKES

OTTAWA—The 130-foot tug *Ashford* has crossed the Atlantic from Southampton to Montreal and has been turned over to its new owners, the Great Lakes Paper Co., of Fort William, Ont.

ST. JOHN TO MAKE KRAFT

OTTAWA — St. John Sulphite Co. is not only expanding its sulphite capacity at Fairville, New Brunswick, but it is understood that company is planning to spend approximately $20 million to produce kraft pulp.

SUPPLIERS

LYNCH CORP. of Anderson, Ind., and Toledo, Ohio, on November 1 will open a new Western Division office and warehouse located at 221 11th Street, San Francisco, Calif. It will be managed by Cal B. Pierce. Art Nielsen from the Anderson plant will serve as the new sales engineer.

The new location will be a sales office and warehouse for PAR air compressors. It will also handle west coast sales of Lynch glass forming machines and Lynch packaging machines. It is planned to warehouse stocks of parts and service PAR air compressors, packaging and glass machinery.

GENERAL ELECTRIC CO.'s Apparatus Sales Division has appointed F. Charles Ruling as manager of the Atlantic district. Mr. Ruling will be responsible for the sale of GE; apparatus products in the states of Virginia, West Virginia, Maryland, and Delaware, most of Pennsylvania, and portions of New Jersey, North Carolina, and Ohio. His headquarters will be in Philadelphia.

James J. Fitzgibbon of Charleston, W. Va., has succeeded to Mr. Ruling's former position as manager of the GE Apparatus sales office in Washington, D. C.

SHELL CHEMICAL CORP. will add to its Houston operations a unit for recovering sulfur from waste refinery gases. Output of the new unit will be sold for conversion to sulfuric acid.

The new sulfur recovery unit, certified by the Government as a necessary defense project, will be constructed by the Ralph M. Parsons Co., Los Angeles. Operation is expected by mid-1952. In the recovery process, waste refinery gases, containing hydrogen sulfide, carbon dioxide and a small percentage of light hydrocarbons, will be burned and catalytically converted to sulfur at an annual rate in excess of 13,000 tons.

WYANDOTTE CHEMICALS CORP. Research and Development Division has named Robert J. Polacek as a field service representative in the market development department.

He will be concerned with the introduction and servicing of new products resulting from Wyandotte's expanding organic chemicals program. Mr. Polacek recently completed the work for his M.S. degree at the University of Notre Dame, and received his bachelor's degree in chemistry at St. Mary's College.

GENERAL ELECTRIC CO. has appointed Francis K. McCune, Schenectady, N. Y., assistant manager of the Engineering Services Division. Mr. McCune formerly was manager of engineering of the company's Large Apparatus Division.

Richard W. Plummer

ARTHUR D. LITTLE, INC., has opened a Latin American office in Mexico City at Edificio International 963, Reforma 1, Mexico 1, D. F. The new office will serve as a convenience to the company's growing number of Latin American clients and will also be valuable in conducting surveys and investigations for U.S. clients who are interested in taking part in the rapid industrial and commercial expansion now taking place in many parts of Latin America.

The office is headed by Richard W. Plummer, who until recently was vice-president of E. R. Squibb & Sons de Mexico and in charge of the Squibb manufacturing laboratories in Mexico.

AMERICAN BITUMULS CO. and Stancal Asphalt & Bitumuls Co., previously affiliated, have been consolidated. A single, national company has been formed under the name of American Bitumuls & Asphalt Co., having the collective manufacture and sales facilities of fourteen district offices and factories in the United States and Puerto Rico. The company manufactures emulsified asphalts under the trademark of "Bitusize," well-known in the paper and board industry for waterproof sizing and adhesive extender agents.

SNYDER CHEMICAL CORP. of Bethel, Conn., announces the resignation of Francis H. Snyder, president, as active head of the firm.

Mr. Snyder, who is prominent in the field of chemicals development, requested his release in order to enable him to devote his full energies to his consulting practice in chemical research, presently located at Newtown, Conn., which in recent months has been making increasing demands on his time. His connection with Snyder Chemical Corp. will be maintained in a consulting capacity.

MACHINE GLAZED BOARD

Increasing interest is being evidenced by United States board manufacturers in the thought of greater bulk with a one side finish on certain types of board. This is accomplished by means of a Yankee Dryer at or near the dry end of the machine. Sandy Hill has provided a means of by-passing the Yankee, if desired. A glazing felt and a dampening or spray outfit is provided to insure thorough contact between the paper and the dryer.

Several special features designed to satisfy the requirements of the customer were incorporated in the Sandy Hill glazed board machine pictured here. Available overhead room made it possible to make special arrangement for the cleaning of the top wet felt and the top felt of the second press. This is a special multi-vat board machine complete with screens and all accessories designed to make everything from patent coated to test liner.

MAINTENANCE—XIII OF SERIES

Careful Grinding and Honing of Machine Knives Pay Dividends

E. T. Larson[1]

The manufacturers of machine knives have rendered a very creditable service to the pulp and paper, woodworking, and steel industries as a result of the great strides they have made in improving the performance and wearing characteristics of their respective products.

In most cases, steels of special alloys and heat treatments, tailor-made to fit the specific knife application, have been developed. Metallurgical research worthy of the finest of cutting tools are embodied in the typical chipper, paper, shear, and woodworking knives available today.

It may be said that all of these improvements have been directed toward one chief objective—to produce a cutting edge that will stand up still longer between grinds with the same or improved quality of cut. To achieve this objective, the knife manufacturer goes to considerable length to grind the cutting edge just right, and to equally great length to hone it, where this is important, as in the case of paper trimmer knives. That this care and skill employed in grinding pays dividends is evident from the fine showing invariably made by a new knife before it has to be reground for the first time.

Sometimes the user will complain that a new set of chipper knives, or a paper knife, after regrinding did not stand up as nearly as long as it did when it was new. Upon investigation, it is usually found that such knives had not been reground or rehoned properly and, in some cases, had actually been burned and ruined by careless or abusive grinding.

It can easily be proved that the most profitable single investment connected with the usage of machine knives—or for that matter, cutting tools of any kind—is the time and care expended to keep the cutting edges sharp. The knife is no better than its cutting edge. Its life between regrinds and the quality of the work it turns out, whether pulpwood chips, paper, or veneer sheets, depends largely on the care taken in resharpening. To grind and hone a machine knife properly, and without burning it, will undeniably

Figure 1—Regrinding Paper Trimmer Knife Using Segment Type Wheel. Photo taken at S. D. Warren Paper Co., Westbrook, Me.

Figure 2—Section of Paper Trimmer Knife after Grinding only. Note Feather Edge.

Figure 3—Close-up of Feather Edge shown in Figure 2, Magnified 250X.

[1] Sales Engineer, Norton Co., Worcester 6, Mass.

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Figure 4—Section of Cutting Edge Shown in Figure 2, magnified 250X after being properly Honed.

take a little extra time and effort, but this is more than offset by its longer life and superior performance, which in turn adds up to lower costs.

Evidence of Dull Knives

The alert, responsible operator looks for the unmistakable signs indicating a dull knife, and does not hesitate to change it for a sharp one *before* the quality of the work begins to suffer, or the cutting edge has broken down completely and perhaps become chipped.

Let's consider for a moment what happens when a machine knife is continued in use after it has become dull. In the case of chipper knives, the percentage of sawdust, oversize and bruised chips will mount. It is considered good practice to change the complete set of chipper knives at the end of each shift—while the cutting edges are only slightly dull and the knives are still doing a good job. In this condition very little stock has to be ground off the knives to resharpen them. This factor, together with the shorter grinding time required, results in longer lasting knives and lower grinding cost.

In the case of paper knives, watch for diagonal streaks on the edges of the trimmed sheets, indicating the presence of nicks or burrs on the knife edge; also for crushed or ragged, instead of cleanly cut edges—evidence of a dull knife.

Change shear knives before the cutting edge has rounded over, or spalled as a result of overloading or continued use after the cutting edge has become dull. In this condition, the knife will tend to cut out-of-square, consume excessive power and, of course, require extensive grinding to recondition it.

An accurately ground cutting edge should, above all, be keen and present an unbroken, even line from one end of the knife to the other. It should be free of any wire or feather edges, nicks, burned spots, or grinding cracks. Burned spots can be ground off with a few passes of the freshly dressed wheel, but the damage in all probability has been done and the cutting edge ruined.

Grinding cracks, rarely visible to the naked eye, are one of the chief causes of poor performance and outright failure of the knife in service. They are the results of abusive grinding, and their presence can be detected by etching with acid.

There are three important elements in reconditioning and sharpening any machine knife: The grinding machine, the grinding wheel, and the grinding procedure. In the case of paper trimmer knives, there is a fourth and very important factor, namely, the honing operation that follows the grinding.

The Grinding Machine

Most of the machines used for grinding straight machine knives are of the horizontal spindle, reciprocating table type of surface grinder, equipped with either cylinder or segmental type wheels. In some cases, for smaller knives, vertical spindle type surface grinders mounting cylinder or cup wheels are used. In some plants, the knives are ground on the periphery of straight wheels. The objection to this type of wheel is that it grinds a hollow or concave bevel which weakens the cutting edge so that it does not stand up as well as edges with a flat bevel.

Regardless of the type of grinding machine used, for best results the machine should be as rigid as possible and maintained in good operating condition. It is practically impossible to produce an accurate, chatter-free surface on the bevel or a keen cutting edge, if the table ways or spindle bearings are worn. Moreover, with all due respect for the skill of the operator generally employed on regrinding machine knives, it is questionable economy to continue to use an old, worn, and vibrating knife grinder that is constantly down for repairs and which, by today's standards, would be regarded as slow, underpowered, and incapable of doing a truly precision grinding job.

The machine assigned to grinding machine knives of any kind—whether for paper mill, steel mill, or woodworking shop, should be looked upon as equal in importance to the production machine on which the knives are used since the efficient and economical performance of the knives is most certainly contingent upon accurate regrinding and honing.

The Grinding Wheel

The grinding wheel should be carefully selected for the particular kind of machine knife and requirements of the grinding operation. The choice of grit size and grade (hardness) is especially important.

In the last few years there has been a noticeable and very encouraging trend toward the use of finer grit wheels for sharpening machine knives. Whereas, formerly, it was almost universal practice to use relatively coarse, 36 grit, wheels with the present-day harder, denser and more wear-resistant alloy steels used for these knives, it is desirable to use wheels at least 46 grit to get effective grain penetration and a good finish.

Some paper mills, in fact, prefer wheels as fine as 60 and even 80 grit,

Figure 5—Surface Grinding Edge of Machine Knife.

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Figure 6—Stoning a Machine Knife Blade Lightly after Grinding.

in correspondingly soft grades. The finer grains, being smaller and sharper, will penetrate the surface of the hard alloy steel more readily than will the larger grains in a coarse wheel. The finer grit wheel, therefore, will cut with less pressure and less danger of burning.

The selection of the wheel grade is equally important. If too soft, the wheel will not hold size, particularly in the roughing cuts, and its life will be short. The greater danger, however, is to use a wheel that is on the hard side of the proper grade. Such a wheel will have a slow-cutting action and unless dressed frequently, will glaze and become increasingly dull. In this condition the wheel is very apt to heat-check and ruin the knife.

Assuming the wheels used are of the cup, cylinder, or segmental type which grind on the flat rim, the grade, as a rule, should not be harder than J for standard No. 8 structure wheels, or harder than G for No. 12 structure (porous type) wheels. The exact grade to use will depend upon the characteristics and heat treatment of the steel and its susceptibility to heat-checking in grinding; also on the type and condition of the grinding machine, size and shape of wheel or segments. For some knives and machine conditions, it may be necessary to use wheels as soft as grade H, for example, 19A46 or 57A46-H8VBE. For other knives, it may be possible to safely use wheels as hard as grade J—57A60-J8VBE, for example. It is always safer to first try wheels on the soft side of the recommended grade range to avoid the possibility of ruining a costly knife by inadvertently burning it with a hard, glazed wheel.

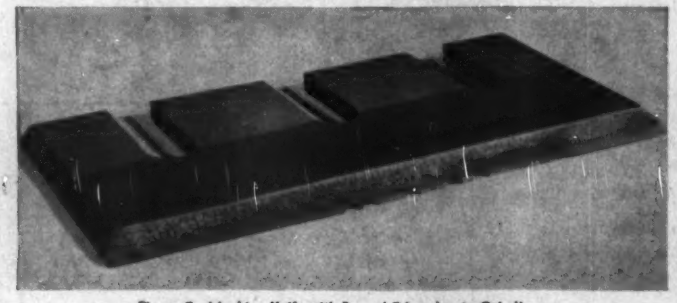

Figure 7—Machine Knife with Burned Edge due to Grinding.

One well-known knife manufacturer recommends using segmental type wheels in the specification 19A46-H8VBE Alundum vitrified for regrinding both chipper and paper trimmer knives. Another manufacturer advocates using finer grit wheels, 57A80-H8VBE, particularly for paper knives.

In the larger wheel sizes, the segmental type wheel is preferable to either the cup or cylinder type inasmuch as the interrupted grinding face promotes a faster and cooler cutting action.

The Grinding Procedure

First, clean the knife bar or magnetic chuck by using an oilstone or a piece of fine abrasive cloth to remove any interferring burrs. Where work clamps or bolts are used, space them about 12" apart and tighten them securely and evenly so that knife is held perfectly flat while grinding.

All chipper knives in a set must be ground to precisely the same height, and lined up accordingly on the table. Paper trimmer knives should be positioned, using a test indicator, so that the distance from back of carriage to back of knife is exactly the same throughout its length.

Wrong and Right Grinding Method

Assuming that the knife grinder is of the horizonal spindle type equipped with a cylinder or segmental type wheel, the operator has a choice of two grinding methods. One is to mount the knife with the cutting edge down so that the direction of wheel rotation at the point of contact with the knife is from the heel of the bevel to the cutting edge.

This setup has several objectionable features. In the first place, the operator cannot readily see what he is grinding. Furthermore, any heat generated in grinding is conducted to the thinnest part of the knife, the extreme cutting edge, where it will do the most harm; also, there is more tendency for the wheel to glaze and load, with consequent danger of burning the cutting edge.

The preferred grinding method is with the cutting edge of the knife *up*, so that the rotation of the wheel is from the cutting edge toward the body of the knife. With this method, the wheel cuts the alloy steel edge first, carrying the chips toward the softer steel back, and any heat generated *away* from the cutting edge. Moreover, when grinding wet, the coolant is much more effective, since the stream first strikes the edge of the knife where it is most needed.

Truing and Dressing the Wheel

A newly mounted wheel must be trued in order to do an accurate, precision job. It is also good practice to dress ("resharpen") the wheel frequently to keep the cutting face clean, sharp, and free cutting, thereby mini-

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mizing any danger of burning the cutting edge of the knife. A Huntington type dresser properly supported against the knife bar is recommended for both operations. A diamond truing tool may also be used. An abrasive brick, however, is not recommended, as it is difficult to hold the brick rigid, and, more important, it is apt to produce a glazed surface instead of opening up the wheel face.

Use Plenty of Coolant

Machine knives of any kind should preferably be ground wet. The coolant may be either clear water, or, to prevent rusting, mixed with sal soda or soda ash in the proportion of one pound to ten gallons of water, with one part soluble oil to eighty parts water.

Use plenty of coolant and direct it at the point of contact between the wheel and the knife. Remember that the purpose of the coolant is to disperse generated heat and thus permit more rapid grinding without danger of the knife getting hot enough to cause cracking at the cutting edge. Too little water is worse than none at all, as it will cause alternate heating and quenching of the knife, with consequent softening or heat-checking of the edge.

Wheel Speed and Feed

Cup, cylinder, and segmental type wheels should be operated at a surface speed of 3,500 to 4,500 f.p.m. If the speed is too low, the rate of wheel wear is liable to be excessive; if too high, the resulting grain and grade may be hard enough to burn and ruin the knife.

In general, the table speed should be in the range of 60 to 80 f.p.m., and the feed or depth of cut not more than .002" per pass, even for roughing. Knives can easily be ruined by using excessively heavy feeds or table speed. Experienced grinder hands have found that best results are obtained by taking light feeds combined with reasonably fast table travel.

Proceeding now to the actual grinding, advance the stationary wheel to the knife so that they just contact. Then back off the wheel sufficiently to clear the knife, turn on the coolant, and start up the wheel and table. Do not exceed the .002" recommended feed per pass. Finish with a die-out cut. If the ground surface is shiny, it means that the wheel is glazed and needs dressing.

Hone Thoroughly

After paper trimmer and veneer knives have been ground, they must be honed to remove the wire or feather edge invariably left by the grinding wheel. The life of the knife between regrinds, and the quality of its cut, depend to a large extent on the thoroughness of the honing job. Simply knocking off the feather edge with a few strokes of an oilstone or a file does not constitute "honing." See *Figures 2 and 3.*

While it seems that operators in different mills each has his own ideas as to the best method of honing a machine knife, the end results are the same where it is done properly, namely, a cutting edge that appears as an unbroken, straight line, without nicks or burr even when highly magnified. See *Figure 4.*

The procedure followed at one paper mill is outlined here for the benefit of those who may be encountering difficulty with honing their paper trimmer knives.

1. Support the knife on a bench at a comfortable height and angle for honing, and be sure the light is adequate to be able to clearly inspect the edge.
2. Using first a medium India oilstone about 1" x 2" x 6" or 8" length, "rough hone" the knife, resting the stone flat on the bevel and applying very light pressure. Some operators prefer to traverse the stone in one direction only, along the length of the knife; others prefer to use a round oilstone that fits comfortably in the palm of the hand, and to hone with a sort of rotary motion along the bevel. Use a fine grade machine oil on the stone and gradually reduce the pressure as each honing stage nears completion.
3. Repeat the same operation, using a fine India oilstone.
4. With a rectangular piece of hard steel, "cut off" any trace of wire edge that may have been pushed back by the oilstone. Supporting the steel lightly between the fingers and resting it flat against the back of the knife, use a series of "chop strokes" or hinge motion from the wrist to shear off the burr.
5. Finally, finish hone the knife with a hard Arkansas stone applied to both sides of the cutting edge, and tipping the stone up about 1/16" at the heel of the bevel. Examine the honed edge with a ten-power magnifying glass for any possible nicks or traces of burr.

In other plants it is the practice to use only two oilstones, an India for rough honing and an Arkansas for finishing, and to dispense with the piece of steel.

One way to tell if a knife has been honed properly is to hold a piece of note paper lightly between the thumb and forefinger, and push it lengthwise against the cutting edge. The knife will readily shear the paper, but the presence of any minute nicks in the edge will send a small tremor up the paper which can be felt. That spot should be marked for further honing.

Obviously, the honing operation, to be done thoroughly, cannot be hurried. Performance figures show that the more thorough the honing job, the greater the life between regrinds, and, therefore, the over-all life and economy of the knife.

After the knife has been honed, it is good practice to paint it with machine or slushing oil to prevent rusting. Of course, this oil should be wiped off before the knife is placed in use.

Burning

Probably more machine knives are ruined by excessive heat generated in grinding than from any other single cause. Not infrequently, chipper knives are returned to the knife manufacturer with the complaint that the cutting edged spalled off for no apparent reason. Upon investigation, it is usually found that the knife has been burned, and the structure of the steel destroyed by abusive grinding. An example of such a knife, acid-etched to show the grinding cracks, is shown on page 11. Seriously burned knives cannot be reclaimed.

Knives are burned in grinding because of one or more of the following reasons:

1. Grinding wheel is too hard (and usually also too coarse) for the highgrade alloy knife steel.
2. Wheel speed is too high or wheel feed is excessive.
3. Wheel is not properly dressed or quantity of coolant is insufficient.

If the coolant adheres to the ground surface, it may be assumed that no undue heat is being generated. If, however, the coolant runs off the ground surface like drops of water off a hot stove lid, then the wheel is probably glazed and is not cutting freely. If not corrected by dessing, the knife will be heat-checked.

Grinding cracks can rarely be seen with the naked eye. One method of detecting their presence is the hot acid etch test. Immerse the knife for forty minutes in hot (160°F.) acid, using one part hydrochloric acid and one part water. Then rinse off the knife in water. This method involves destruction of the knife, but is positive. The Magnaflux method may also be used.

PULPWOOD PRODUCTION UP

Pulpwood production in Virginia for 1950 exceeded one million cords, but increases in other southeastern states dropped Virginia to fourth place.

Some 775,000 cords were of pine; 249,573 of various hardwoods; and 19,455 of chestnut that was also worked for tannic acid.

Although pines still predominate, there is a significant increase in the amount of hardwoods being used. In Alleghany, Amherst and Buckingham, hardwoods exceed pine, while in several other counties they are a considerable proportion to the cut.

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PLASKON.

The Optimum Size of Machines

J. G. Wilson

Assistant Managing Director (Research and Engineering),
Australian Paper Manufacturers Ltd.

Summary

The problem of selecting sizes and numbers of units of equipment for a particular installation is examined. To facilitate this selection equations have been developed based on observations reported in technical literature that capital cost varies as the function x^b, where x is the rate of output or capacity of the plant and b is a constant for the particular type of equipment.

Some representative values of b are given and the cost variations associated with a varying number of operating units are represented graphically for various values of b.

The paper concludes with a practical application of the mathematical argument and a general inference that large machines and few of them are to be preferred.

Introduction

In the design of any plant, it is often necessary to decide what size of machine and how many of them will be installed to perform a certain task. These questions arise with such items as boilers, turbo-alternators, pumps, motors, pipelines, digesters, liquor heaters, tanks, etc. The list is not exhaustive and could include most components which are made to order or which are obtainable in a variety of sizes, e.g., motor-generator sets, chippers, screens, deckers and stock preparation equipment.

The general practice is to have several small units rather than a single large one, because multiplicity will spread the risk of breakdown, reduce the cost of standby equipment and facilitate maintenance. The author has observed that the number of units selected for a particular task is sometimes a matter of judgment or even guesswork. This paper examines the problem of optimum size. While the results obtained do not provide the complete answer, some of them should be useful to the design engineer.

Influencing Factors

The main factors which influence a decision as to the number of units to provide a given operating capacity are:—

(a) the need for multiple units and spares
(b) capital cost per unit of capacity
(c) capital cost of several identical items
(d) capital cost of identical items constructed as a group
(e) operating cost and efficiency

These factors are considered in the subsequent subsections.

The Need for Multiple Units and Spares

With any machine or section of a plant, its availability (i.e., the propensity of being available when required for use), the time necessary for repair after a breakdown, and its essentiality in the general scheme, may call for one or more spares. To provide any spare or standby unit there must obviously be at least two units. With two units it seems extravagant that half the available capacity must always be idle, which leads to the idea that it would be better to have three or four or more, so that a correspondingly lesser proportion of the available capacity is idle. The limit to this contention is that costs generally rise as the number of units for a given task is increased. The magnitude of the increase will be demonstrated subsequently.

Substantial fluctuations in load may make several small machines preferable to one large machine, especially if the operating charges of the machine at small load are high compared with the charges at full load. Pumps with constant speed motors are an example.

The ability of some machines to carry overload continuously or for short periods and the variation in efficiency with load can be important. It might well be satisfactory to have say four units with no spare, provided that any three of the four could carry the desired load, even if inefficiently, for relatively short periods when one unit may be off the line. In fact it might be acceptable if the three units could carry only say 80 per cent of the desired load. This state of affairs can arise for instance in a boiler installation where the omission of the spare unit can save much money.

In the extension of an existing plant, the size of equipment already installed may influence (perhaps unduly) the size of new items to be added. Interchangeability of spare parts may be important, but all too often new models of the same size do not have parts which are interchangeable with those of older models. It should not be accepted without investigation, that all units should for preference be of the same size, because circumstances occur where uniformity is not advantageous. Where wide fluctuations in load occur, these might be handled more efficiently with the various combinations of several machines which are not equal in size. Frequently the economic advantages of large machines will outweigh any gains from uniformity.

If it is known or probable that the capacity of an installation will be increased at a later date, this consideration may influence the size of the earlier units. In fact this is often a sound reason why the units of an original installation should be as large as practicable.

Whether a standby should be provided or not is a problem of costs and actuarial probabilities. To be justified the total cost of owning and maintaining the standby should be less than the expectation of probable losses if a standby is not provided. The extra cost of having one or more spares, and variations in cost dependent upon the number of units to provide a certain output, can, as a rule, be computed with fair accuracy and what seems to be a satisfactory general approach to this calculation is explained later. However, the author has found no useful general equation to give the expectation of probable losses likely to arise from possible interruptions due to breakdowns, essential maintenance and other causes.

Speaking generally and perhaps over-simplifying, the following are the possible courses in decreasing order of cost and decreasing order of reliability:—

(i) to provide multiple units with one or more spares
(ii) to provide multiple units without a spare
(iii) to provide a single large unit

The stipulation that an installation must provide continuous and full service for long periods may make it obligatory to provide at least one spare. The problem is then simplified somewhat as it is only necessary then to decide what is the optimum size or total number of units under course (i) and the relative merits of courses (ii) and (iii) can be disregarded. Similarly if multiple units are necessary (for instance to meet load fluctuations), course (iii) need not be considered.

Presented at the 4th General Conference of the Australian Pulp & Paper Industry Technical Assn. in Melbourne.

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Capital Cost per Unit of Capacity

For most machines or items of plant, the installed capital cost per unit of capacity falls as the size increases and there is a simple general relation between the cost of a machine and its size as measured in terms of capacity. Other authorities (1) (2) (3) have demonstrated that the cost varies as x^b, where x is capacity or rate of output and b is a constant for the particular device. This statement was verified by the author, but supporting data are not presented here.

The value of the index b may tend to vary gradually over a very wide range of size but within the range required for the purpose of this paper, which is from one to say eight, b is fairly constant. Irregularities were noticed in a small proportion of the data examined and anomalies exist in the list prices of certain mas-produced machines such as electric motors.

Some representative values of b are shown in *Table I*, which was compiled partly from the references mentioned and partly from the author's correlation of manufacturers' data and like information.

TABLE I
Approximate Values of b for Various Installations

Description	Unit of Capacity	Approximate value of b
Boilers for steam generation	lb./hr.	0.6 to 0.8
Turbo-alternators	kw.	0.65 to 0.8
Electric motors, installed	hp.	0.5 to 0.75
Tanks and gas holders	cu.ft.	0.5 to 0.7
Condensers and heat exchangers	sq.ft.	0.5 to 0.6
Pipelines	gal./min./hp.	0.4 to 0.6

Such values should be used cautiously because an index may vary somewhat with differing conditions. To find the value of the index b for a particular set of data, plot cost against output on log-log graph paper and the points should fall closely about a straight line, the slope of which is the value of b.

Further examination from a theoretical point of view that cost varies as x^b, should be a suitable subject for another paper. Mr. S. Zinn, Power Engineer, Australian Paper Manufacturers Ltd., has drawn the author's attention to the fact that cost is approximately proportional to weight for similar machines. The principles of dynamical similarity and theory of dimensions would probably give the relation between mass and unit of capacity, and thence the value of b.

If the installed capital cost is denoted by p, then p varies as x^b, where x is the rate of output, so that the cost per unit rate of output is p/x, which must vary as x^{b-1}. It follows that the relation between cost per unit rate of output and size ratio as measured in terms of output, is given by the equation

$$\frac{p}{x} = x^{b-1}$$

To illustrate the effect for various values of b, p/x is plotted against x in *Figure 1*, which graph has logarithmic scales to facilitate drawing.

Capital Cost of Several Identical Items

For any device where a choice in size is practicable and the value of b is ascertainable, this value can be used to assist in determining the optimum number of identical units in an installation which is required to have a given capacity or rate of output.

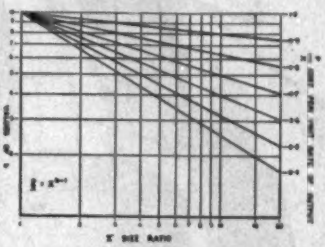


Figure 1.—Relationship between cost per unit rate of output and size ratio

If an installation comprises n items each of output, x, which are all operating to produce the required total output Q,

$$\text{then } Q = nx \text{ and } x = \frac{Q}{n}$$

If the capital cost per item equals Ax^b, where A is constant, and y is the total capital cost for n items,

$$\text{then } y = nAx^b = AQ^b \frac{n}{n^b}$$

With one spare or standby item in addition to the n operating items, the total capital cost z is given by

$$z = (n+1)\,Ax^b = AQ^b \frac{n+1}{n^b}$$

The equations are simplified and the argument is not affected if the constants A and Q are both made equal to one, so that the comparative capital costs become—

$$y = \frac{n}{n^b} \text{ with no spare}$$

$$z = \frac{n+1}{n^b} \text{ with one spare}$$

The above equations are illustrated by the graphs in *Figure 2*. The curves are most illuminating and also pleasing to the eye. It is of passing interest to show by differentiation, that the z curves have minima where

$$n = \frac{b}{1-b}$$

and points of inflection were

$$n = \frac{b+1}{1-b}$$

A study of *Figure 2* will indicate the cost variations associated with changing the number of operating units to produce a given output. Taking a typical value of b of say 0.7, consider the two curves with this value; firstly the broken line for y with no spare and next the full line for z with one spare. Without a spare the total installed cost increases rapidly; for example, as the number of operating units increases from one to five the total cost increases from 1.0 to 1.62, but the total operating capacity is constant.

With one spare the position is somewhat different and the cost falls from 2.0 (with one operating unit and one spare) to a minimum of about 1.85 with two or three operating units (that is three or four installed units). As the number further increases the curve rises again.

Figure 2 should be studied in relation to the subsection 'The need for multiple units and spares' and it is important to observe the greatly increased capital cost of having multiple units as compared with a single unit.

The capital cost is further increased as the number of spares increases and with m spares the capital cost becomes

$$= \frac{n+m}{n^b}$$

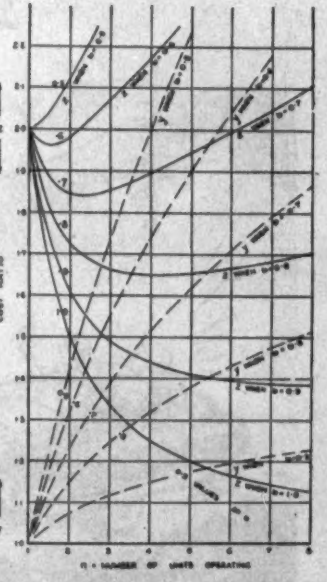
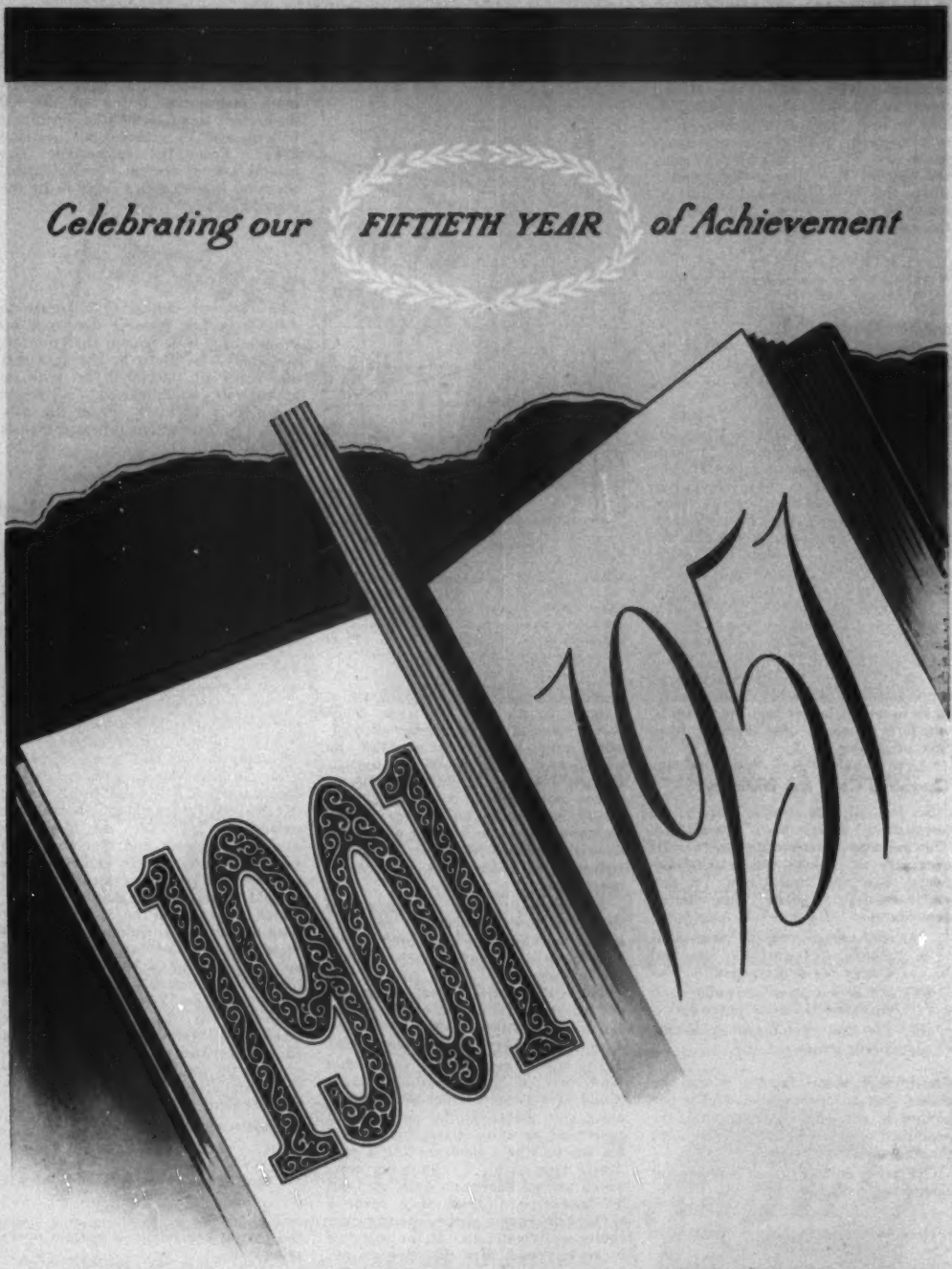


Figure 2.—Cost variations associated with changing the number of operating units to produce a given output, for varying values of the index b and for either no spare (y) or one spare (z) in the installation



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Capital Cost of Identical Items Constructed as a Group

If several identical plant items are constructed simultaneously or in close succession, the cost of the second, third, and subsequent units will probably be less than the first unit. If the first costs 1, assume the subsequent units cost $(1-r)$; and let Y equal the cost of n operating units and Z equal the cost of $(n+1)$ units of which n are operating, then following the same reasoning as before:

$$Y = \frac{1+(n-1)\ (1-r)}{n^b} \text{ with no spare}$$

and

$$Z = \frac{1+n\ (1-r)}{n^b} \text{ with one spare}$$

The value of r varies widely with different types of equipment and would range perhaps from 0.05 to 0.40. To give an idea of its effect on the curves of *Figure 2* (where $r = zero$), these curves have been redrawn in *Figure 3* with $r = 0.2$ which is a high value for most items of heavy plant. For other values of r, interpolations can be made between *Figures 2* and *3*.

It is interesting to compare *Figures 2* and *3*, but bear in mind that the assumed value of r corresponds to a high reduction in cost for units after the first. In general the effect of an increase in the value of r above zero, is to favour a larger number of units, which is more or less obvious from first principles.

Operating Costs and Efficiency

So far only the capital costs of an installation have been considered. Turning now to operating costs, it is necessary to observe the relation between these and capital costs for any particular type of plant. This relation depends on:

(i) the useful life of the plant which determines its real charge for depreciation
(ii) the depreciation allowable each year for taxation purposes
(iii) the rate of interest applicable to the project.

Considering these factors it can be shown that an operating cost of g per annum is equivalent to a capital expenditure of gD where D depends on the factors stated above.

Operating costs will fall into several categories, namely:

(a) labour charges for operation
(b) maintenance charges for labour and material
(c) materials consumed in the process with which can be included heat and power.

Considering again an installation designed to produce a required total output, it is reasonable to assume that the

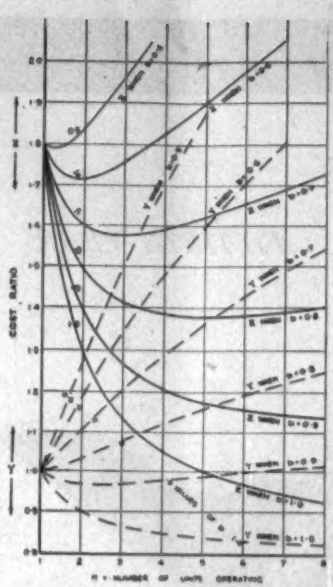

Figure 3.—Cost variations (modified by a repetitive factor $r = 0.2$) associated with changing the number of operating units to produce a given output, for varying values of the index b and for either no spare (Y) or one spare (Z) in the installation

costs (a) and (b) would amount to a fixed charge plus a charge which would vary as n, the number of operating units. A spare or standby unit would cause an additional maintenance charge, but this might be neglected since maintenance costs all round would be less, because more of the maintenance would be done in normal working hours with a corresponding reduction in extra rates of pay for overtime.

The cost (c), for materials consumed, will depend upon the efficiency of the machine, which generally tends to rise as its size increases. It is a fair assumption that the cost of materials will comprise a fixed charge for the required total output plus a charge for wasted material which will vary as n, the number of operating units.

The above assumptions mean that some part of the operating charges would vary as the number of operating units and therefore the capital cost equivalent to those charges will equal kn, where k is a constant for a particular type of plant. Operating costs which are not dependent on n need not be considered. Values of k cover a very wide range with differing machines and conditions. If the value of k can be found, then the effect of operating costs which vary as the number of operating units, can be seen on *Figure 2* or *Figure 3* by setting up a straight line with a slope equal to $-10k$. The slope is $-10k$ and not $-k$ because the curves are drawn with a vertical scale ten times greater than the horizontal.

The following example will illustrate the method: Consider a boiler installation required to have a maximum continuous rating of 300,000 lb./hr. of steam from the operating boilers and to include one standby boiler. From the sub-section 'The capital cost of several identical items' the total capital cost z is given by the equation

$$z = AQ^b \frac{n+1}{n^b}$$

The required output Q is equal to 300,000 lb./hr. Assume that cost investigations have shown that $b = 0.8$, and that A is given by the fact that one boiler of 100,000 lb./hr. with its appropriate buildings and equipment would cost £225,000. From the sub-section quoted above this cost equals Ax^b, so that

$$225{,}000 = A\ 100{,}000^{0.8}.$$

Substituting:

$$z = 225{,}000 \frac{(300{,}000)^{0.8}}{(100{,}000)^{0.8}} \cdot \frac{n+1}{n^b}$$

$$= 542{,}000 \frac{n+1}{n^b}$$

The 'appropriate buildings and equipment' above mentioned are the items of which the costs are affected by n and not by Q alone.

Reverting to operating costs, each operating boiler will introduce extra costs, in addition to those which are independent of the number of boilers in the installation. Assume that the extra costs for wages are £3,300 per annum per boiler and that the extra costs for materials are £1,500 per annum per boiler. This means a total annual charge of £4,800 per boiler, which charge can be capitalized by multiplying by a suitable factor D mentioned at the beginning of this sub-section. For a boiler installation of a public company a reasonable value of D would be 12, so that the capital equivalent of these annual charges would be 12 times £4,800 which equals £57,600 per boiler. With n boilers operating, the total capital equivalent for the installation is 57,600 n, and let this equal w.

Thus it is established that:—

the capital cost, $z = 542{,}000 \frac{n+1}{n^b}$ and

the capital equivalent of certain operating costs,

$$w = 57{,}600\ n$$

whence

$$\frac{z+w}{542{,}000} = \frac{n+1}{n^b} + 0.106\ n$$

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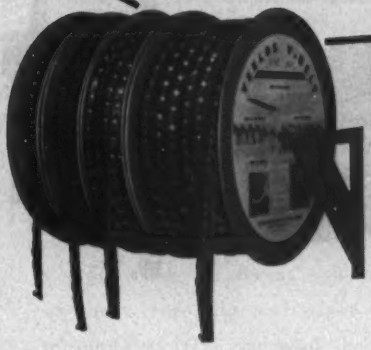

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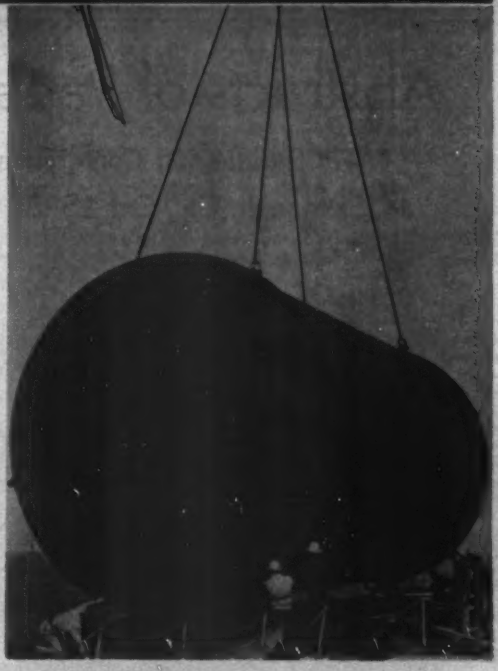
A portion of the recent production of equipment for pulp and paper mills at Newport News has included the digester above and the flow tank on the right.

The flow tank was delivered by use of the deep water facilities at Newport News, while the digester was shipped by direct rail transportation. Shipment was expedited in both instances by use of these facilities.



NEWPORT NEWS
SHIPBUILDING AND DRY DOCK COMPANY
Newport News, Virginia

Thus the constant k referred to above, has the value 0.106 in this example. If on *Figure 2* a straight line with slope of —1.06 is drawn tangentially to the curve of z when $b = 0.8$, it will show that the minimum value of $(z + w)$ occurs when the nearest integral value of n is 2.

Alternatively if values are tabulated we obtain:—

n	1	2	3	4	5
$\frac{n+1}{n^b}$	2.00	1.73	1.66	1.65	1.66
$0.106\,n$	0.11	0.21	0.32	0.42	0.53
$\frac{z+w}{542{,}000}$	2.11	1.94	1.98	2.07	2.19

It should be noted that the considerations discussed in the sub-section 'Capital cost of identical items constructed as a group' have been neglected, since in the author's experience the reduction in cost per boiler is small even when several are ordered simultaneously.

The above example may not be entirely representative. Operating costs will, in general, increase as the number of operating units increases, and therefore some allowances for this may be necessary in using the curves of *Figures 2* and *3*.

Concluding Remarks

In the planning of an installation, the curves of *Figure 2* can be used to obtain a first approximation as to the optimum number of units for a particular task. The curves should indicate whether the provision of a spare unit is worth consideration. Next it will probably be necessary to obtain comparable prices for several sizes of the machine at and near the supposed optimum size, and with these prices to estimate the installed capital cost and operating cost of the installation arranged in different ways. Then these estimates should be weighed with other relevant factors including those which may not be assessable directly in terms of money.

A general inference from the paper is to prefer large machines and few of them.

It will be noted that this general inference applies to a set of reasonably static circumstances. However, where there is an expanding market, as in Australia with its growing population, the likelihood of subsequent additions to any installation means that the best number of units should be selected, taking account of the possible ultimate capacity of the plant, and therefore there is an even stronger argument in favour of selecting the largest practicable size of units initially.

Acknowledgments

This paper was developed from the principle that the cost of plant varies as x^b, which fact was brought to the author's attention by Mr. A. R. M. Johnson, Project Engineer, Australian Paper Manufacturers Ltd.

The author is grateful to several suppliers of equipment, whose price data were used to provide basic information.

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Abstracts of Papers

TAPPI Engineering Conference

Savannah, Ga., Oct. 15-18

Gathering TAPPI Data Sheets—Henry J. Perry, Paper Trade Journal and R. T. Bingham, TAPPI

The Technical Association issued its first Data Sheets in 1939 with the intention of adding to them on a yearly basis to the end that eventually they would constitute a pulp and paper industry engineering handbook. The Data Sheet Committee is well organized and has a system that appears to be well adapted for the screening of suggested material. It has been hoped that committees and individuals would provide acceptable data, however, results have been disappointing. A plea is made for better cooperation if the Data Sheet service is to develop into the source of information that was intended.

Pump Difficulties in Pulp and Paper Mills—Parkman A. Collins and J. G. Rearick, Warren Steam Pump Co.

The varied kinds of paper and the special furnishes to make them have created special pump problems. These are apart from the familiar entrained air difficulties and have to do with gaseous conditions. They appear to be related to vapor pressure considerations such as we apply to condensate work. There are not sufficient data available as yet, however, for intelligent calculations. Such calculations are precise in the case of boiler feed and condensate work and it is believed the same factors could be applied if we knew more about the physical properties of these stocks with respect to vapor pressure and surface tension. This would enable us to make more exact recommendations regarding suction head and recirculation so as to keep pump suction chamber clear of gas and not block the passage of stock to impeller inlet.

Exploration of this field can be forgotten when someone designs suitable apparatus for removing air from stock in this area of the pump. This appears difficult yet not impossible. When accomplished it will make centrifugals completely reliable even though they may be set far from chests with unfavorable suction connections and handling gaseous stocks. The same principle would automatically take care of the nuisance problem of excessive entrained air encountered quite frequently on ordinary furnishes and which we now solve by good pump designs and by paying special attention to layout in cooperation with the mill.

Mill Engineers Selection of a Paper Machine Drive—Part II—A. N. Ball, the E. B. Eddy Co.

The first paper, Part I, of this study was given by Roland Packard at the Fourth Engineering Conference in 1949 and was followed by an interim report last year in Cincinnati. In continuing this investigation a large number of questionnaires were sent out to which 25% of the companies solicited responded.

A drive will be required to fulfill the following functions reliably, consistently and, from the operator's point of view, simply:—

1. Maintain an overall machine speed within the limitations of the machine, as selected by the operator.

2. Provide means of accelerating and decelerating each section of the machine, and when necessary, a prolonged slow crawl for any section, as well as inching.

3. Rapid and accurate draw adjustment for individual sections. Also, adjustment of the wet end section should automatically adjust all forward units, whereas adjustment of the dry end section should automatically adjust all preceding units.

4. Momentary speed changes in any section to take up slack.

5. Facilities for reversing the calender stack are very desirable when running many grades of paper—where plugging is somewhat prevalent.

For clarification and simplicity of approach the various types of drives

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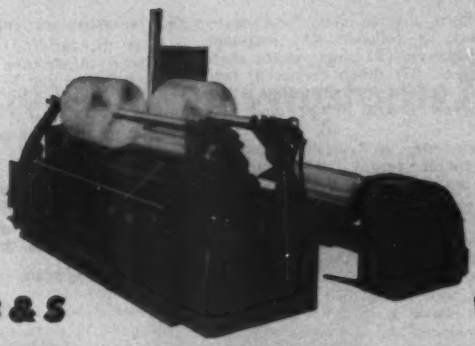

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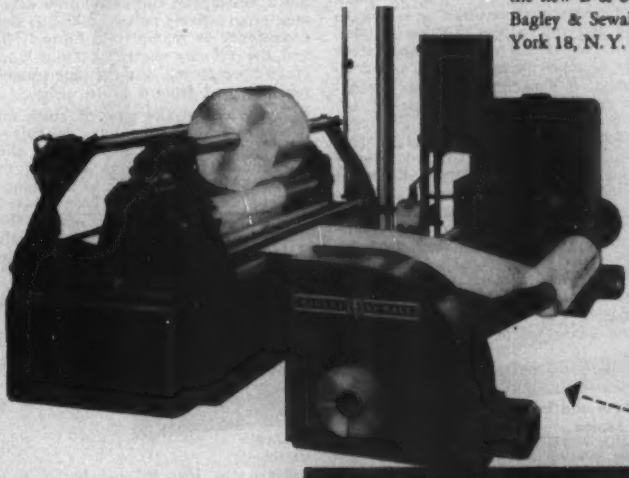
"The engineering of this new unit indicates a fine understanding of the problems of the users of this type of equipment. The Backstand is much easier to handle as there are no shafts. It is also much easier and faster to make changes on it. I believe that changing rolls with this Backstand can be brought down to well under one half minute."

You may purchase the B & S Shaftless Backstand with or without the new B & S Slitter and Rewinder. The Backstand may be used on any type of rewinding equipment, as well as on waxing and laminating machinery, printing presses, etc.

For full details on the Shaftless Backstand and the new B & S Slitters and Rewinders, write to The Bagley & Sewall Company, 500 Fifth Avenue, New York 18, N.Y.



THE B & S #55 SHAFTLESS BACKSTAND features automatic tension and side register control; motor for raising and lowering mill roll arms, also motor for moving the arms to accommodate different width rolls. Entire working mechanism is totally enclosed.

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have been divided into four main divisions, as follows: (1) sectional electric drives. (2) single motor electric drives. (3) direct connected turbine drives, and (4) hydraulic variable speed drives. These are discussed.

In studying the various points of the general survey, the following points stand out clearly.

1. For machine speeds of over 1000 f.p.m., the rapidity of adjustment and accuracy of speed regulation indicate a definite advantage in favor of the sectional electrical drive.

2. A well maintained single motor electric drive is an extremely satisfactory drive, and answers all the requirements at speed of less than 1000 f.p.m. with the exception that an adjustment of the wet end section will not automatically adjust all forward units, nor will adjustment of the dry end section automatically adjust all preceding units.

3. Crawling can be accomplished with both systems with helper motors. With narrow, reasonably slow machines (around 750 f.p.m.) the drum type clutch will permit crawling of the driers for a fair length of time. For speeds in excess of 750 f.p.m. it is advisable to slow down the driers during crawling operations to save the burning of and the resultant high maintenance on clutches.

Measuring the Density of Rubber Covered Paper Mill Rolls—Ralph M. Leighton, Stowe-Woodward, Inc.

There are in use three instruments for testing rubber covered rolls—Shore type "A" Durometer, Adams Densimeter, and the Pusey & Jones Plastometer. Readings were taken using these three instruments and compared with the values given in the Vanderbilt Handbook, 1941.

There is no over-all comparison and correlation of the three measuring instruments. A comparison can only be made within the same stock. This can be done by plotting curves for each individual stock in use. Even by this method, we can expect as high as 5 points variation between the given Durometer and Plastometer readings. This is logical since the Durometer and Densimeter are spring instruments, and by their nature cannot be accurate as compared to the Plastometer. It seems that the optimum and most accurate readings would be the Plastometer, taken at the end of a minute exclusively, thereby eliminating the necessity of comparison.

Methods of Estimating Costs of Engineering Projects and Consideration of Indices That May Be Used—H. G. Ingraham, Chas. T. Main, Inc.

During a meeting of the Engineering Research and Machine Design Committee which was held last year at Cincinnati, it was proposed that methods be established to assist in the estimation of engineering costs.

It is the belief of the committee that some information on preliminary cost estimation can be obtained but it will be necessary to decide upon a system for keeping it up-to-date. Discussion on this subject will be invited by the committee.

A Shear Criterion for the Hydraulic Behavior of Paper Stocks in Pumps, Pipes, Valves, and Flow Meters—Victor P. Head, Fischer & Porter Co.

Apparent viscosity of a non-Newtonian fluid is not a fluid property, nor does it have meaningful physical dimensions in mass-length time in the absence of completely defined flow geometry. The slope and intercept of the shear diagram are truly fluid properties which remain constant over wide ranges of shear rate and which have the physical dimensions of viscosity and of stress respectively. The terms slope viscosity and apparent yield stress are proposed as descriptive of these properties. If found acceptable, the word slope might ultimately be dropped when sufficient familiarity with the concept has eliminated the confusion with "apparent viscosity" which would certainly exist at present. The definition of viscosity might then be altered to mean the slope of the shear diagram in all cases, while the difference between true and non-Newtonian fluids would be expressed merely by the value of the apparent yield stress, which is, of course, zero for Newtonian fluids. Slope viscosity assumes a negligible role and yield stress in shear a dominant role in the case of paper stock flow in pipes, pumps, valves, and flowmeters. A shear criterion has permitted very precise correlation of the flow coefficients of variable-area flow meters in stock service, and a fiber-length criterion has provided an easy method of expressing the limits of validity of the shear criterion. The shear theory of the flow meter has been extended to illustrate the possibility of a variable-area consistency meter. Promise of equal success in the case of pipe friction appears evident, and it is hoped that the yield-stress concept will prove useful in many other phases of paper engineering.

An Analysis of Data on Stock Flow in Pipes—Richard E. Durst, Andrew J. Chase and Lyle C. Jenness, University of Maine

A mathematical analysis of the head loss due to pipe friction in transporting pulp stock suspensions has been made of three of the major sets of data published; the Bracht and Heller, the Forrest and Grierson, and the Cameron data. Other data were not used due either to their unavailability or the lack of time to study them.

The correlations proposed by two earlier workers were studied. The Cooper correlation defined an apparent viscosity which was evaluated by the equation, $\log \mu = \log 0.095DC^3 - 0.05u$. The Peterson correlation introduced a pseudo-Reynolds No. having the dimensions Vp, where $S =$ consistency. $\frac{}{S}$

The proposed correlation based on the Brecht and Heller data for unbleached sulphite pulp uses a plot of a friction factor versus a pseudo-Reynolds No. (Re' No.) defined by the following equation $\frac{\Delta H_t D}{u^2 L} = f = \phi \frac{D^{0.205} u\rho}{C^{1.187}}$. This relationship holds for the Brecht and Heller data within ± 7% for all consistencies, and for velocities below a value in feet per second equal to the consistency raised to the 1.2 power.

The corresponding correlation for the Forrest and Grierson data for sulphite pulp has a Re' No. $\frac{u\rho}{D^{0.4}C^{1.87}}$, and for groundwood the Re' No. is $\frac{D^{0.25}u\rho}{C^{1.385}}$. Both these relationships hold with ± 25% for all pipe diameters, consistencies, and velocities presented in the data.

The Cameron data gave a correlation with a Re' No. $\frac{D^{0.01}u\rho}{C^{2.52}}$ for groundwood. The relationship is good within ± 30% exclusive of consistencies below 1.8% b. d. stock. For these low consistencies the correlation deviated progressively up to +100% as the consistency decreased from 1.8 to 1.5% and the velocity increased from 4 to 16 feet per second, and the pipe diameter increased from 6 to 16 inches.

The effect of the type of stock on head loss may be illustrated by referring to a further analysis of the Brecht and Heller data. Referred to unbleached sulphite stock as the standard, the head loss may be predicted for the following stocks within the limits indicated by correcting the calculated head loss for unbleached sulfite stock by the percentages indicated:

Stock	Re' No. range	Deviation from sulphite, %	Expected % deviation
Unbleached sulphite ..	8— 80	0	± 7
Bleached sulphite ..	16— 64	—12	+ 5
Unbleached straw	16— 40	—55	±11
Bleached straw	16— 40	—10	± 1
Groundwood	16— 64	+42	± 6
Cooked groundwood	16— 64	0	± 6
Sulfate	16—100	—10	±15

The Brecht and Heller correlation showed the highest order of consistency with a single body of data using the proposed analysis. Based upon this observation the data of Forrest and

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- High Maintenance Costs
- Excessive Paper Machine Breaks
- Low Mullen on Test Liner

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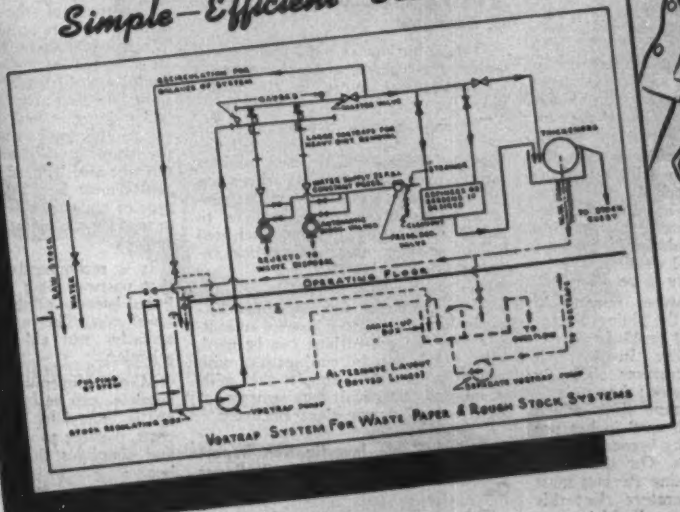
Simple—Efficient—Economical



Let us acquaint you with the simplicity of installation and ease of operation of Vortraps for your waste paper stock system.

Nichols Engineering & Research Corporation

70 PINE STREET, NEW YORK 5, N. Y.
40 S. LOS ROBLES AVE., PASADENA 1, CALIF.
1477 SHERBROOKE ST. W., MONTREAL 25, CANADA

Grierson and Cameron were correlated using the Brecht and Heller Re' No. The result was a family of nearly parallel curves relating the friction factor and Re' No. Working from this chart the head loss may be predicted within the limits indicated:

Data group	Re' No. range	% deviation
Brecht and Heller, unbleached sulphite..	8— 80	± 7
Forrest and Grierson, sulphite	6—120	±25
Forrest and Grierson, groundwood	10—150	±25
Cameron, groundwood	20—200	±50

The Brecht and Heller data relating freeness to head loss showed that freeness has less effect than the deviation of ± 7% in the proposed correlation. A correction for freeness therefore, does not seem feasible at this time. Also within the range of 18 to 35° C., temperature does not affect the head loss beyond the accuracy of the correlation.

Materials and Design of Piping Systems for High-Pressure and High-Temperature Service—E. A. Kerbey, Midwest Piping & Supply Co.

Until several years ago, the highest temperatures encountered in paper mill steam piping were 700 to 750°F. close to but not impinging upon the upper limits for carbon steel material. With plans for operations at 900°F. with 1200 p.s.i., an entirely different condition, high pressure and temperature service needs be reconsidered. This is especially important because of the constant changing of code requirements.

One of the first considerations in the design of piping is the selection of the proper grade of steel. In this three factors must be held in mind: the performance under the expected operating conditions; its workability in bending, lapping, forming, and welding; and its availability. These are to be discussed.

Increased temperatures operate in two ways to present the piping designer with more difficult problems of expansion and flexibility. In the first place, greater temperatures obviously mean greater expansion; hence in a high-temperature steam line, which may expand as much as 9 inches per hundred feet, flexibility becomes a very serious consideration. On the other hand, allowable working stresses must be reduced as temperature rise; this requires greater pipe wall thicknesses which in turn tend to reduce the flexibility of the system. The net result of these two effects is to compound the problem of flexibility so that the designer must give increasing attention to the means of accommodating pipe expansions—not only to prevent distortion and rupture of the piping itself, but also to prevent the steam line from exerting excessive reaction on the equipment it connects. In many cases, the manufacturers of turbines and other equipment now specify maximum permissible thrust at connections, and some ask that the piping layouts be submitted for flexibility analysis by their own engineers.

In the design of hanger, anchors, and supports, the same degree of engineering judgment and skill is required as for the design of the piping itself.

This limited analysis is intended to do no more than to outline some of the problems involved in high-temperature pressure piping systems, and to emphasize a thread of thought which inevitably must be woven through any discussion of this topic: that at temperatures above 750°F., every aspect of the piping problem—design, fabrication and erection—becomes more exacting in its demand for special knowledge, special skill, and special equipment.

The Power Requirements of Fourdrinier Sections—W. Mikelson, General Electric Co.

Several modern machines have been studied to determine how power is distributed throughout the fourdrinier elements to provide a basis for the re-evaluation of existing power constants used to calculate and predict power requirements on new machines. A more accurate procedure has been derived.

Combustion Gas Turbine Applications in the Paper Mill—W. B. Wilson & W. C. Bloomquist

The gas turbine is well suited where both electric power and process steam is required as it is in the paper industry.

The various gas turbines available for Paper Mill applications will be described. Slides will be used to show various cycle arrangements where gas turbine exhaust gases are used to generate steam in waste heat boilers, to supply combustion air for fuel-fired boilers, and for other exhaust-heat recovery applications.

The gas turbine is well suited for mill expansions or for new mills. Examples and curves will be used to indicate how the gas turbine can be used, either alone or in conjunction with steam turbines, to supply the mills steam and electrical requirements at high over-all power plant efficiency.

Electrical Cable Investigation Report —A. O. Mortenson, St. Regis Paper Co.

This is a progress report that treats of the purpose of the investigation, outlines accomplishments to date, suggests work for the future and points the way toward what is best to use for the various services in all departments of each and every branch of the pulp and paper industry. Briefly, the investigation is being conducted for the purpose of establishing power cable specification standards from what is best in the field today. And, the many North American Mills and others, including the cable manufacturers, who have cooperated and are cooperating in this effort have demonstrated the necessity and the urgency for this progressive step.

Conditions peculiar to each department are considered. Methods of installation are also taken into account, as is common causes of cable failure and the predominant location of those failures.

The data obtained have been brought together in chart form for presentation as part of this report.

While much work remains to be done and specifications have yet to be written it is felt that much of interest and value has been gathered together here.

Use and Maintenance of Steel Windows in Pulp and Paper Mills—K. S. Frazier, Detroit Steel Products Co.

Extreme humidites, acid vapors, and alkaline vapors are found in the various divisions of a paper mill. All of these elements create a maintenance problem above the average for industrial plants. The need for proper and scheduled maintenance of ferrous materials is apparent. Where lack of sufficient protective maintenance has allowed corrosion to gain the advantage, repair or replacement maintenance becomes the problem. With steel windows corrosion usually sets up first toward the bottom of the window and in weathering bars around the ventilators. When replacement bars are available these windows can be repaired by the simple expedient of removing the glass lights, cutting out the corroded bars and welding in new bars. The difficulties of this method are, clearing away the masonry sills and jambs to free the corroded bars, obtaining the proper replacement bars and the cost of this type of maintenance. Cost will in many cases indicate replacement rather than repair.

It is recommended for replacement that postwar sizes of windows be selected because of their availability and lower cost. The manufacturer's representative can aid materially in this selection.

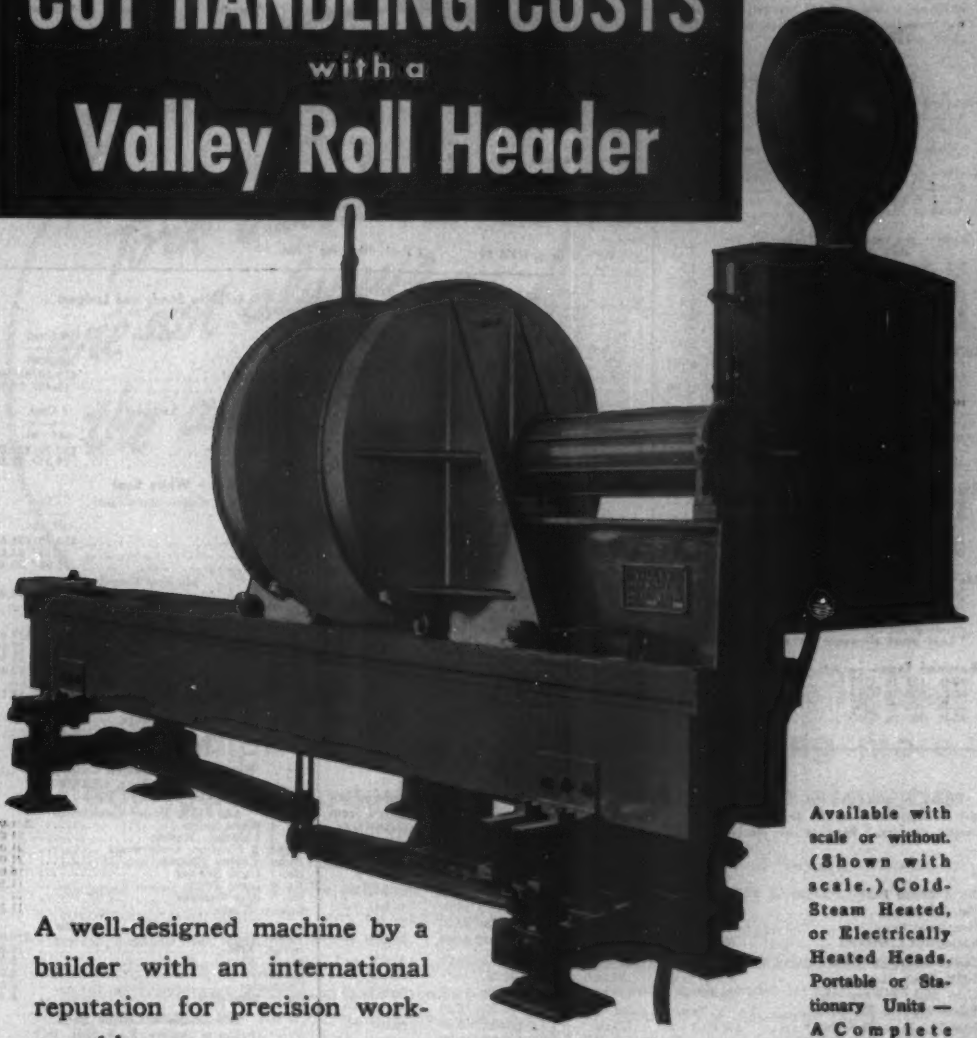
Masonry openings prepared so that windows can be installed after masonry is complete reduces installation costs, damage to units by other trades, and simplifies the maintenance problem.

Proper paint often applied with periodic wire brushing before application is a good protection for steel although it is stated authoritatively that no paint used today is 100% impervious to moisture which is the medium of corrosion.

The hot-dip galvanizing of steel windows and ferrous hardware which is no commercially available provides a surface treatment which through the example of installations watched for periods of 20 and 30 years is a proven superior and enduring protection.

(Continued on page 45)

CUT HANDLING COSTS
with a
Valley Roll Header



A well-designed machine by a builder with an international reputation for precision workmanship.

Available with scale or without. (Shown with scale.) Cold-Steam Heated, or Electrically Heated Heads. Portable or Stationary Units — A Complete Service.

THE VALLEY ROLL HEADER

VALLEY IRON WORKS CO., APPLETON, WISCONSIN

PRICES

The prices below reflect market quotations in New York at the mill level on standard grades. Does not include spot offerings.

PAPER AND BOARD

Standard News, Delivered Ports
- Rolls, contract, per ton $114.00/116.00
- Sheets ..... 130.00/ —

F.a.b. Mills, C.l. Frt. allowed, dock, N. Y.

Kraft— gr cwt., 40# base wgt.
- Standard Wrapping Rolls ..... $7.75/$8.00
- No. 1 Wrapping Rolls 8.25/ 8.50
- Standard Bag ..... 7.50/ —

Tissues— per ream 24x36 (480) 10 lbs. 2000 lbs or more

Wh. No. 1 Frd.	$2.25 /$2.40
Wh. No. 1 MG	2.25 / 2.40
Wh. No. 1½	1.95 / 2.05
Wh. No. 2	1.75 / 2.00
Kraft Anti-Tar 20x30	2.12 / 2.25
White Anti-Tar 20x30	2.20 / —

Toilet— per case or 100 rolls—1 M sheets

Unbleached 4½x4½	$8.00/$8.25
Unbleached 4½x5	6.60/ —
Bleached 4½x4½	10.00/12.50
Bleached 4½x5	9.85/ —

Per Case of 50 rolls—2000 sheets

Unbleached 4½x4½	$8.00/$9.75
Bleached 4½x4½	6.95/ —

Per Case of 100 rolls—1000 sheets

Facial, 4½x4½, 2-ply	$8.95/10.15

Paper Towels— per case of 3750

Wh. Jr. M'tif'd 9½x9½	$6.40
Br. Sr. M'tif'd 9½x12	4.40
Br. Jr. M'tif'd 9½x9½	3.90
Br. Jr. Sgl. fold 9½x10¾	3.95
Bleached 7½x11, 24/25 rolls	$7.00/7.55

Manila, per cwt.

No. 1 Jute Tag, 100-lb., sheets*	$20.55/22.55
Reg. Jute M.F. 40-lb., sheets*	19.50/21.50
Wrapping Manila	8.75/10.50
Printing Manila	10.50/12.00

* Less usual allowance for rolls.

Gummed Tape— per bdl., 500 bdls. or more

90-lb. 375 ft. GSI	$7.20 / —
60-lb. 600 ft. GSI	7.20 / —
35-lb. 800 ft. GSI	8.28 / —
35-lb. 500 ft. GSO	6.31 / —

MARKET WOOD PULP

Fourth Quarter Contract Prices. Per Short Air-Dry Ton

	Varying freight allowances *U. S.	Canadian	On Duck Atlantic Ports *Swedish	*Finnish	*Norwegian
Groundwood	$92.50/ —	$395.00/100.00			
Sulfate, Bleached	145.90/ —	190.00/200.00	$230.00/ —	$230.00/ —	$230.00/ —
Semi-bleached Sulfate	140.00/ —				
Sulfate, Unbl.	132.50/ —	145.00/175.00	200.00/ —	200.00/ —	
Sulfite, Blchd.	140.00/ —	160.00/175.00	225.00/ —	225.00/ —	225.00/ —
Sulfite, Unblchd.	132.50/ —	150.00/160.00	200.00/ —	200.00/ —	
Sulfite, Unbl'd (Glassine)		164.00/ —			
Soda, Blchd.	140.00/ —	151.00/160.00			
Sulfite Screenings	72.50/ —				
Sulfate Screenings	67.50/ —				
Groundwood Screenings	68.00/ —				
Unblchd Sulfate Sideruns	132.50/ —				
Stand. News. Sideruns	92.50/ —	106.00 —			

* OPS Ceiling, CPR 49 ‡ F.a.b. Shipping Point.

Boards per ton—

Filled News	$107.50/ —
Plain Chip	105.00/107.50
Blchd. Mla. L-d. Chip	147.50/ —
White Pat. coated .020	170.00/ —
Kraft Liners 42 lb.	115.00/117.50
Kraft Corr. .009	122.50/126.00
Binders Boards	137.50/140.00

The following prices are representative distributors' resale prices:

Rag Content Bonds and Ledgers— White, 20 lb.

Bonds	4 Cins. per cwt.
100% Rag Ex. No. 1	$70.45/$75.90
100% Rag	62.65/ —
75% Rag	48.15/ —
50% Rag	38.90/ —
25% Rag	31.65/ 33.00

Ledgers	4 Cins. per cwt.
100% Rag Ex. No. 1	$72.65/$72.80
100% Rag	63.90/ —
75% Rag	49.40/ —
50% Rag	40.20/ —
25% Rag	33.00/ 34.30

Sulphite Bonds and Ledgers White, 20 lb.

Bonds	4 Cins. per cwt.
Watermarked	$19.00/$20.50
Plain	18.40/ 19.50

Ledgers	4 Cins. per cwt.
Watermarked	$20.30/$21.80
Plain	19.35/ 20.80

White Book

Conversion Coated	Case per cwt.
No. 1	$23.90/$24.65
No. 2	22.15/ 23.40
No. 3	21.90/ 22.40
Machine Coated	
No. 1	$18.40/$18.90
No. 2	16.65/ —
Uncoated	
No. 1 Antique (Watermarked)	$18.65/$19.65
Offset	18.65/ 19.90
A Grade K. F.	18.10/ 19.50
A Grade S. C.	18.65/ 19.40
B Grade K. F.	18.40/ —
B Grade S. C.	17.40/ 19.15

‡ Indicates a price change.

WASTE PAPER MARKET

Prices to mills, per ton, f.o.b. cars shipping point (includes brokers' fee.) These quotations are an indication of the price range in each market on the date specified, as gathered from major dealers. Because of market instability, ALL PRICES ARE STRICTLY NOMINAL.

	New York Oct. 11	Philadelphia Oct. 5	Boston Oct. 13	Chicago Oct. 2
No. 1 Mixed Paper	$14.00/ 15.00	$10.00/ 12.00	— / 13.00	$12.00/ —
No. 1 News	16.00/ 17.00	12.00/ 14.00	— / 15.00	15.00/ —
Over-issue News	20.00/ 22.00	20.00/ —	20.00/ 22.00	18.00/ —
Corrugated Containers	20.00/ 24.00	18.00/ 20.00	19.00/ 24.00	20.00/ —
Double Kraft Ld. Corr. Cuts	55.00/ 60.00	50.00/ —	55.00/ 70.00	55.00/ —
100% Kraft Corr. Cuts	65.00/ 90.00	80.00/ —	90.00/ —	85.00/ —
Used Sugar & Flour Bags	70.00/ 75.00	50.00/ —	45.00/ 70.00	50.00/ —
Super Resorted Br. Kraft	Nominal	65.00/ 70.00	60.00/ 70.00	50.00/ —
New Br. Kraft Env. Cuts	120.00/130.00	125.00/ —	120.00/140.00	100.00/ —
New Br. Kraft Cuts	100.00/125.00	115.00/ —	110.00/140.00	90.00/ —
No. 1 Gdwd Shvs.	60.00/ 70.00	16.00/ 50.00	65.00/ 75.00	35.00/ —
White Newsblanks	75.00/ 80.00	50.00/ 70.00	70.00/ 80.00	55.00/ —
No. 1 Flyleaf Shvs.	65.00/ 70.00	50.00/ 65.00	85.00/100.00	60.00/ —
No. 1 Soft Wht. Shvs.	125.00/145.00	135.00/145.00	140.00/165.00	125.00/ —
Super Soft Wht. Shvs.	160.00/175.00	150.00/165.00	155.00/180.00	135.00/ —
Hd. Wht. Shvs.	165.00/180.00	170.00/180.00	170.00/180.00	140.00/ —
Hd. Wht. Env. Cuts	180.00/200.00	190.00/210.00	190.00/200.00	150.00/ —
New Manila Env. Cuts	100.00/135.00	130.00/140.00	130.00/155.00	65.00/ —
Col. Tab Cards	90.00/ 95.00	75.00/100.00	85.00/110.00	85.00/ —
Manila Tab Cards	120.00/140.00	125.00/140.00	140.00/160.00	100.00/ —
No. 1 Mixed Ledger	85.00/ 95.00	75.00/ 85.00	67.00/ 90.00	95.00/ —
White Ledger	105.00/115.00	105.00/115.00	95.00/110.00	110.00/ —
No. 1 Book & Mag.†	33.00/ 37.00	23.00/ 30.00	30.00/ 50.00	17.00/ —
No. 1 Rep'd. Hvy. Books‡	43.00/ 50.00	30.00/ 40.00	45.00/ 60.00	40.00/ —

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% groundwood.

RAG MARKET

New Domestic Cotton Cuttings
OPS Ceiling Price, CPR 28
Delivered Mill Basis

Add 7½% Dealer Commission

No. 1 White Shirts	$21.00
No. 1 Unblchd. Muslins	21.00
Blchd. & Unblchd. Underwears	21.00
Blchd. Canton Flannels	21.00
No. 1 Light Silesias	16.00
No. 1 Light Prints	11.50
No. 1 Blue Overalls	14.50
Suntan Khakis	11.50

Add 10% Dealer Commission

Fancy Shirts	$10.00
Indigo Blues	10.00
Mixed Khakis	8.00
Corduroys	8.00
Cottonades	8.00
No. 1 Washables	6.50

Old Domestic Cotton Rags
(Prices to Dealers, F.a.b. Ship. Pt.)

	Per 100 lbs.
Mixed White	$5.00/$5.50
Cotton Pants & Overalls	4.25/ 5.00
Thirds and Blues, Repacked	4.00/ 4.25
No. 1 Roofing Rags	nominal
No. 2 Roofing Rags	nominal
No. 3 & 4 Roofing Rags	nominal

Bagging
(Prices to Dealers, f.a.b. N. Y.)
PRICES NOMINAL

	Per 100 lbs.
Foreign Gunny	$5.00/$5.50
Domestic Gunny, No. 1	5.00/ 5.50
Heavy Wool Tares	5.50/ 6.00
Foreign Manila Rope	9.00/ 9.25
Domestic Manila Rope	9.00/ 9.25
Jute Strings	6.00/ 6.50
No. 1 Sisal Strings	8.00/ 8.25
Paper Mill Tares	4.25/ 4.50
Foreign Scrap Burlap	4.25/ 4.50
Domestic Scrap Burlap	4.75/ 5.50
Austr. Wool Pouches	7.00/ 7.50
New Burlap Cuttings	7.00/ 7.50

Fork trucks are not always the answer

This Elwell-Parker High Lift truck is 30% lighter than comparable fork models—leaving more floor-load capacity for handling and storage

This Elwell-Parker ELN-6T has had its platform replaced with forks to handle palletized loads. Total weight with battery is 2 tons *less* than a fork truck of same load capacity (6000 lbs.) . . . Fork trucks are heavier because they must be counterweighed to balance the outboard load, whereas on high lift models, the forward underframe and wheels support much of the load.

On many jobs, particularly in older buildings, this advantage is very important:—More goods can be tiered higher on the same floor space. Where floor or elevator capacities are limited, high lift models are often the *ONLY* type of tiering truck that is practical. Load stability is greater. In addition, high lift trucks cost less.

ELWELL-PARKER OFFERS YOU UNBIASED ADVICE whatever your truck needs. Its line is not restricted. Included are ALL basic types—fork, high lift, low lift, cranes, tractors. Available in over 40 sizes and models. Let us have an ✱ man recommend trucks for *your specific requirements*. The Elwell-Parker Electric Company, 4192 St. Clair Ave., Cleveland 3, Ohio.

ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

FREE BOOKLET fully explains scientific materials handling. Ask for "Industrial Logistics".

MATERIALS

Aluminum sulfate:		
comm. bags, wks.	cwt.	1.65
iron-free c.l.		3.25
Alcohol, ethyl:		
tax free, dnm. c.l.	gal.	1.01 / 1.05½
deld. East Miss.		
Alcohol, methyl:		
Synthetic, Zone 1, dnm.		
c.l. fit. a/d.	gal.	.4[illegible]
Casein, acid prec.:		
dom. sh. pt. c.l.	lb.	.38 / .41½
imp. ex. dock	lb.	.29½/ .40
Caustic soda:		
c.l. wks. solid, 76%, cwt.		3.35
flak. & grd. 100-lb. drums		3.75
liquid 50% tanks		2.55
liquid 70% tanks		2.65
China clay:		
dom. air-float. filler, c.l. wks.	ton	18.00
water-washed, comp. filler		11.00
coating		17.60 /30.50
imported, ex whse.	short ton	15.20 /28.35
Chlorine:		
single-unit tanks, works	cwt.	2.70
multi-unit	cwt.	3.25 / 4.40
Formaldehyde:		
USP, inh. dnm. c.l. wks.	lb.	.0625/ .0675
l.c.l., E. wks.		.0675/ .0725
Fuel oil:		
Bunker C, No. 6 Cal. bwy tanks, refinery	bbl.	1.95 / 2.15
light	bbl.	2.00 / 2.25
Hydrogen peroxide:		
USP, 35% chys. E. of Miss.	lb.	.23½/ .26½
Lime:		
hydrated, bags, wks.	ton	13.50
Rosin:		
B gum, drms, c.l. Savan.	cwt.	7.00 / 9.00*
G, H, I, K	cwt.	9.10 / 9.40*
FF, wood, dc.	cwt.	6.80 / 7.30*
* OPS Ceiling, CPR 82.		
Rosin size:		
70%, gum & pale grds, tank cars, south, sh. pt.	cwt.	7.20 / 7.35
Salt cake:		
dom. bulk, c.l. wks.	ton	17.00
wks. frt. all	ton	20.00 /22.00
Soda ash:		
light, 58%, bags, wks.		1.50
bulk	cwt.	1.20
Sodium silicate 40°:		
turbid, c.l. wks.	cwt.	1.30 /
l.c.l. wks.		1.60 / 1.85
Sodium peroxide:		
dnm. c.l. E. of Miss.	lb.	.21
l.c.l. do.	lb.	.21½/ .22
Soybean, protein:		
chem. ind, wks. c.l.	lb.	.24 / .28
Cmn. and Chic.		
Sulfuric acid:		
60° Be. chys. c.l. wks.	cwt.	1.75 / —
l.c.l. wks.	cwt.	2.05 / 2.85
Sulfur:		
crude, c.l. mines, contract,	long ton	21.00 /32.00
f.o.b. vessels Gulf		22.50 /23.50
Sulfur dioxide:		
liquid, comm. cyl. wks.	lb.	.09
multi-unit cars	lb.	.0635
Starches:		
pearl corn, bags, c.l. wks.	cwt.	6.09 / —
white dextrines, c.l. wks.	cwt.	7.48 / —
potato, Idaho, c.l. wks.	cwt.	5.75 / —
potato, Maine, c.l. wks.	cwt.	6.00 / 6.25
tapioca, conv. dextrines	cwt.	7.75 / 8.00
low, Siam, ex dock N.Y.		5.75 / — nominal
Talc:		
domestic, 50-lb. sacks, c.l. wks.	ton	23.00 /30.00
Titanium dioxide:		
anatase, c.l. deld., bags	lb.	.21 / .21½
l.c.l. deld.	lb.	.22 / .22½
rutile, c.l. deld.	lb.	.22 / .22½
l.c.l. deld.	lb.	.24 / .24½

NEW LITERATURE

American Wood-Preservers' Assn., 839 Seventeenth St., N.W., Washington 6, D. C. Report, "Wood-Preservation Statistics." Compiled by Henry B. Steer of the Forest Service, U. S. Dept. of Agriculture.

Baker-Raulang Co., Baker Industrial Truck Div., Cleveland, Ohio. Bulletin, report No. 351, "Baker Trucks at Work." Tells how the Dobeckmun Co., Cleveland, uses three Baker fork trucks to keep up with skyrocketing production rates; Bulletin 1327, "Baker Type FS Fork Trucks." Technical plus sales copy.

City Savings Bank & Trust Co., De Ridder, La. Bulletin, "Fostering a Crop of Tree Farmers." Reprint. Tells how a bank is helping to prove that "money grows on trees."

Crawford Fitting Co., 884 East 140th St., Cleveland 10, Ohio. Catalog B-151, "Swagelok Tube Fittings." Describes and illustrates complete line of tube fittings available in brass, aluminum, steel, stainless steel, and Monel. Includes dimensional information, cross section drawings, installation recommendations and assembly instructions.

General Electric, Schenectady, N. Y. Bulletin, GEA-5556, "Drives for Stock Preparation." Outlines benefits G-E drives for pulpers, beaters, refiners, pumps, and other stock preparation apparatus. Illustrated. Lists nine other bulletins available concerning electrical equipment for pulp and paper mills.

Harry A. Lowther Co., Joliet, Ill. Brochure, "Lowther Tree Planter Model TM With Removable Coulter for Unprepared or Prepared Soil." Sales plus technical copy. Illustrated.

The Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio. Bulletin, "Embeco Method for Setting Floor Brick." Gives complete specifications. Interest to those who install, and use, floor brick and heavy tile floors. Illustrated.

Merritt-Chapman & Scott Corp., 17 Battery Place, New York 4, N. Y. Booklet 24 pp., "Annual Report 1950." Highlights of 1950 Operations; President's Report; The M-C&S Organization; Construction Department; Marine Salvage Dept., etc.

Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Pa. Specification Sheet No. 419-1, "Air-Operated Diaphragm Motor Valves." Gives size, construction, body pressure range, connections and complete mounting dimensions: Instrumentation Data Sheet No. 10.15-4a, "New Davis Combustible Gas Analyzer System." Describes the operation, application and design features: Catalog 8000, "Vane Type Electric Contact Controllers." Describes and illustrates.

U. S. Government Printing Office, Washington 25, D. C. Book, "Testing of Measuring Equipment, A Manual for Weights and Measures Officials," by Ralph W. Smith, National Bureau of Standards Handbook 45 VII, 205 pp, 18 diagrams and half-tone illustrations, price $1.25.

National Production Authority, U.S. Dept. of Commerce, Washington 25, D. C. NPA Report 1275. Reviews the second quarter of 1951 operations of the containers and packaging industries.

Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C. Book, "Three Keys to Strength-Production, Stability, Free-World Unity." Third quarterly report to the President by the Director of Defense Mobilization. 30 cents.

Library of Congress Photoduplication Service, Publication Board Project, Washington 25, D. C. Book, PB 104 431, "The Properties of Magnesium Alloys Fabricated from Atomized Powder." Prepared by the Dow Chemical Co. for the Air Force, 445 pp. including tables and photographs, sells for $56.25 in photostat and $9.00 in microfilm form. Enclose check or money order payable to the Librarian of Congress.

Field Research Div., Paper Cup and Container Institute, Inc., 551 Fifth Ave., New York 17, N. Y. Booklet, "Single Service News." How Hospitals Use Paper Service; Al Jolson Canteen; Washington Disaster Plans; Republic Aviation; Red Cross Bloodmobile.

ENGINEERING CONFERENCE

(Continued from page 40)

Electrical Maintenance, Electronic Equipment—H. R. Meyer, Westinghouse Electric Corp.

Having realized the importance of an adequate maintenance program, the importance of the establishment of systematic records cannot be overemphasized. There must be a record of operations to be preferred, and what was done to correct the trouble to prevent frequent reoccurrence.

The three greatest enemies of the continuous operation of electrical equipment are dirt, grease, and moisture. Because of the necessity for water in pulp and papermaking, moisture can be a problem but if you can't keep it dry at least keep it clean. The following simple instructions are recommended: (1) Wipe off direct with clean dry cloth. Note: Do not use waste. (2) Blow out dirt with compressed air. Note: Air pressure should not be over 50 pounds. (3) Draw dirt out of ducts with vacuum (dry conditions). (4) Remove dirt with solvents. (5) Under extreme conditions washing off with water.

Lubrication is also a point to which attention should be directed. With the newer bearings, however, it is not as important as it used to be.

Electric motors should be inspected regularly if trouble free operation is desired. Most inspections in a well organized plant can be limited to the three senses: look (for any outward appearance of faulty operation), feel (for vibration, looseness, and heat), and listen (for any noise or unusual sounds).

In regard to electronic equipment, maintenance should be assigned to one familiar with the equipment keeping in mind that if it is working within reasonable limits, leave it alone.

Maintenance of Insulation in Pulp and Paper Mills—Paul Corning, Rayonier, Inc.

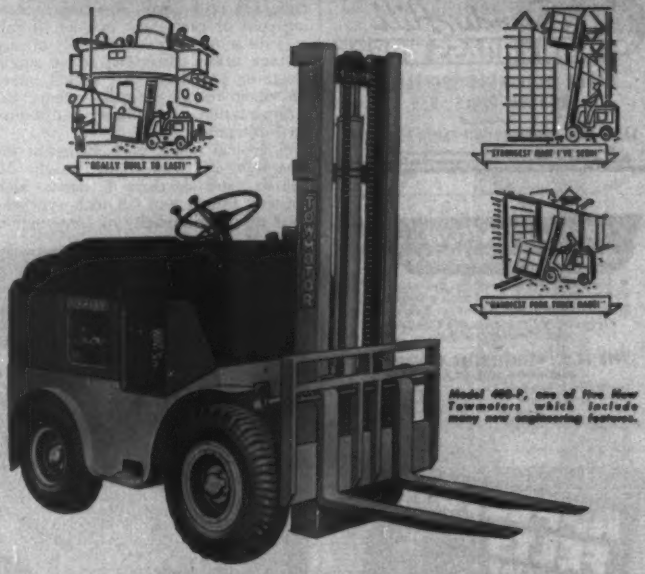
The ultimate purpose of investing in insulation is to save fuel, and to attain the best net saving from this type of investment any new or repair insulation project should be well planned. It would appear that there are three phases of a well engineered insulation installation: (1) Selection of the most suitable type of insulation, (2) Arrangements for a well designed installation, and (3) Adoption of a regular inspection and maintenance plan.

In connection with the selection of insulation, it is proposed that the round table discussion include dissertations on physical properties and advantages of various insulations, the Asbestocite casing, the Ernst method of protecting insulation, and the use of plastics.

(Continued on page 48)

handling experts everywhere are talking about the

NEW TOWMOTORS!



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New Equipment

Small Synchronous Motor

A small synchronous motor with unusual operating characteristic is announced. The first of new Allis-Chalmers developments being made available to original equipment designers on an experimental basis. The motor operates on the reluctance principle, has no brushes, slip rings, rotating coils or permanent magnet. It can be built to operate continuously at any voltage below 250 volts, either single phase or polyphase, and should interest designers of control systems, instrumentation, and military and industrial equipment.

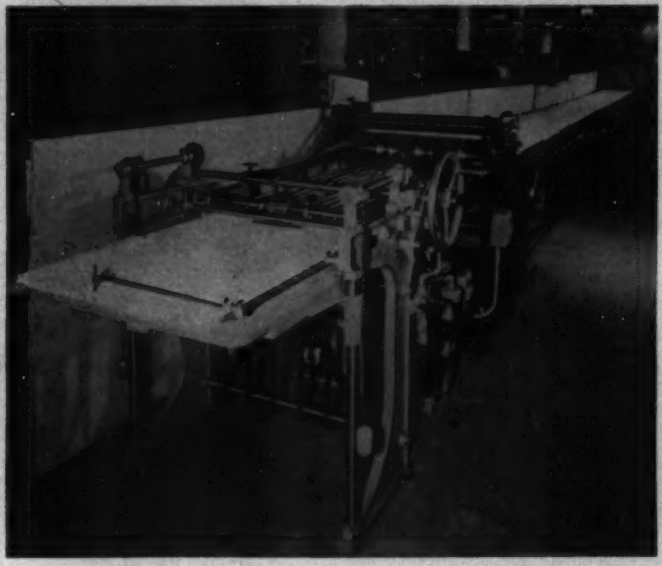
A typical motor is 4 inches in diameter by 2⅛ inches long, weighs 2.6 pounds, and develops 8 ounce-inch starting torque and 0.8 inch synchronous torque. Simplicity of construction provides high stock resistance and practically no maintenance. No starting equipment is required, the motor being able to start and pull into step at any frequency from 10 to 400 cycles.

Allis-Chalmers Mfg. Co., General Machinery Div., Milwaukee 1, Wis.

Magnetic Amplifier Control

The new controller is used with the E-M Adjustable-Speed Magnet Drive to give precision speed control.

Described as a simplified magnetic amplifier control, the unit is designed to eliminate all the complicated electronic circuits of the previous electronic type amplifiers. A simple saturable core reactor amplifier system using non-moving parts accomplishes the precise, stepless control of speed



28" Conveyor Gluer

According to the manufacturer, paper of all weights up to 3-ply index and from 6" x 6" to 28" x 36" sheets can be stripped or solid glued automatically on the new conveyor gluer. Sheets are fed automatically and delivered glue side up on an endless belt conveyor. Forced drying equipment can be installed, if required, as well as a suction conveyor for thin sheets. The machine has a variable speed control up to 3,000 sheets per hour and can use any kind of glue. For hot glues, a thermostatically controlled glue pot can be furnished. The suction pile feeder is equipped with side-wise register control for perfect registration of glue.

A continuous pumping mechanism for the reserve tank can be supplied to maintain a constant level of adhesive in the five gallon feed tank. Jogger delivery is standard equipment. All rollers except the applicator roller, are brass. The applicator roller is stainless steel and can be removed for cleaning. The tank is also quickly removed for cleaning. Overall dimensions are 5 feet wide by 16½ feet long. The conveyor belt can be supplied to any length desired. Manufactured by Potdevin Machine Co., 1285 38th St., Brooklyn 18, N. Y.

to within ± 0.5% of speed called for. This hairline sensitivity is obtained through a current amplification ratio of approximately 20,000 to 1.

E-M Adjustable-Speed Magnetic Drives are built in ratings of 25 horsepower and higher in the usual motor speeds. They are popularly applied to loads such as fans, centrifugal pumps, and centrifugal compressors.

Write to Electric Machinery Mfg. Co., Minneapolis 13, Minn.

Cathodic Protection Extended

Extension of cathodic protection to include complete engineering, design and installation of devices is announced. Engineered installations utilize direct current radiating from anodes to suppress galvanic cell activity and prevent corrosion in underground pipe lines, water storage tanks, lead-sheathed cable, flocculators, clarifiers, etc.

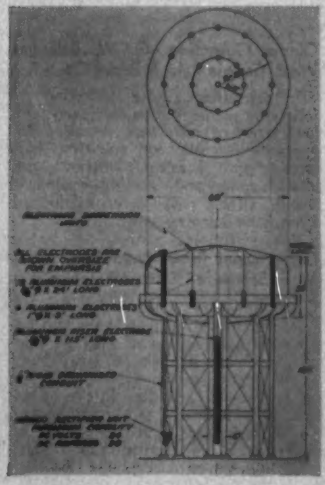
In a Harco installation for water storage tanks, for instance, alternating current from the nearest outlet is converted to direct current by means of a transformer-rectified unit and sent to anodes mounted inside the water tank or tower. The current radiates from the anodes in all directions, using water as the electrolyte, to every portion of the underwater steel surface in such magnitude as to oppose electro-chemical action of corrosion.

For underground installations, the Harco method utilizes the soil as the electrolyte, and a direct current is impressed upon the anodes and radiates through the soil to the metal surfaces. The current enters the metal surfaces of the pipe or other underground structure and prevents the chemical action which corrodes metal.

All Harco installations utilize especially designed oil-immersed selenium rectifiers and ground anodes and backfill materials manufactured specifically for these applications. Anodes of graphite, carbon, zinc, magnesium, platinum, aluminum, steel or steel alloys are specified according to the requirements of each installation.

In every application, numerous factors must be considered for maximum cathodic protection. Among these are soil conductivity and moisture content, soil and water chemical characteristics, dissolved oxygen content, temperature, seasonal variations of environment, protective coatings, dissimilar metals, position of other metallic structures and presence of stray currents.

Send inquiries to R. J. Stambaugh, Harco Corp., 17008 Broadway, Cleveland, Ohio.



Conveyor Deflector

A new deflector that makes truck and car loading more nearly automatic has been developed. Attached to the platform end of the telescoping portable conveyor, the deflector automatically guides cartons off the permanent belt conveyor and shunts them at a 90° angle onto the portable telescopic conveyor which extends into the truck, trailer or box-car. Both right hand and left hand deflectors are supplied to take care of removal to either side.

Advantages claimed for complete Wilkie car and truck loading systems are: fully automatic operation to the stacking point; no height adjustments

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needed when conveyors are shortened or extended; one man can set up the system in a few minutes; system can be used on either side of a conveyor belt moving in either direction; equipment is readily mobile and can be used anywhere on the loading platform; loading in minimum time at minimum labor cost. Manufactured by the Wilkie Co., 5520 Arch St., Philadelphia 39, Pa. Catalog on request.

Two-Row Planter

Users report plantings as high as 4500 seedlings per hour with the new Two-Row Planter, the manufacturer states. Using special tool bar hitches for various models of heavy tractors, the regular TM planter and the Shelterbelt Planter form the Two-Row Planter. Each planter shoe is hinged separately. Minimum setting space of the Shelter Belt Planter in rows is named as 6 to 9 inches—governed by speed of tractor. Row spacing is 18 inches and up.

The availability of scalper plows also is announced.

Manufactured by Harry A. Lowther Co., P.O. Box 1412, Joliet, Ill.

ENGINEERING CONFERENCE

(Continued from page 45)

Properties of Synthetic Rubber and Thermoplastics as Insulation and Sheaths on Electric Cables—E. W. Davis, Simplex Wire & Cable Co.

As a result of chemical research and technological developments during and subsequent to World War II, there has become available to electrical engineers concerned with the distribution and utilization of electrical energy, a new field of electrical insulating materials and protective sheath coverings that offers a wide range of electrical, chemical, and physical properties consistent with longer life expectancy than thought possible less than a decade ago when the use of natural rubber was almost universal in rubber compounds used in the manufacture of electric cables.

The essential properties of an insulating and sheath compound for an electric cable depends primarily on the service conditions including operating voltage, current load, system characteristics, temperature of surroundings, exposure to heat, light, and moisture—and for cables used in the pulp and paper industry, exposure to many chemical solutions not generally found in other industries.

Replies to a recent questionnaire prepared by the TAPPI Subcommittee on Cables and sent to all of the operating plants of the pulp and paper industry showed that the predominant causes of cable failures have been as follows—

1. Deterioration due to age and oxidation.
2. Deterioration due to exposure to oil, water, sunlight and chemicals.
3. Improper termination and splicing.
4. Damage to cable during installation.

There was a considerable spread between the assigned causes of the cable failures as reported by the plants employing various processes of pulp treatment (sulphite, sulphate, groundwood, rag, etc.) but there was a definite pattern which assigned the four causes listed above as being predominantly important.

The paper to be presented herewith, points out how, by employing some of the synthetic rubbers and thermoplastics available today, the wire and cable failures due to the first two causes listed above can be considerably reduced. Comparison of the properties of the synthetic rubber compounds with those employing natural rubbers as a base will be presented. No attempt will be made to discredit natural rubber compounds for use in electric cables, but rather to point out the better essential properties of the synthetic rubbers for this purpose.

Cinder Collection—G. W. Bollinger, West Virginia Pulp & Paper Co.

In discussing cinder collection the following points will be discussed: various types of collectors, installed and operational costs, air pollution, bark burning unit (cinder collection), and how furnace and burning equipment design affects carry over of fly ash from bark burning units.

Education of Power Plant Engineers—M. F. Schnaufer, Detroit Sulphite Pulp & Paper Co.

Managements of most pulp and paper mills are confronted with the complex problem of how to train new power plant personnel and to bring old personnel up-to-date in the operation of complicated power equipment. To be successful a program must be well planned and managed as a long-term investment acceptable to both

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All Splicing Tapes

management as well as to the employees and their union.

To provide a basis for discussion the curriculum offered by the Dow Chemical Company for their power plant engineers is outlined.

Ventilation for Comfort of Personnel —L. G. Janett, J. O. Ross Engineering Corp.

Correlating the studies that have been made in so-called "hot" industries such as underground mining, the steel, and the aluminum industries, a preliminary set of thermal standards for industry have been recently set forth by a committee of the American Public Health Association. Included in these studies are laboratory and army experiments on the maximum continuous high temperatures that can be tolerated by humans under varying working or metabolism rates. A preliminary standard has been set forth, subject to change, that considers a temperature to be safe at which operators can work continuously provided that their pulse rate remains under 125 and their body temperature remains below 101°F. These standards are presented in table form.

Paper machine room conditions are compared with these standards and factors of worker comfort and morale are discussed together with the effect of high temperatures on worker and production efficiency.

Effective temperature as a composite temperature combining dry bulb temperature, wet bulb temperature, air velocity, and radiation factors is explained to show that the old saw "It isn't the heat, it's the humidity" is true in principle.

The engineering aspects and measures to improve the temperatures in the operating areas are outlined. These include standard hoods, complete insulated enclosures of paper drier sections, air exhaust systems, and air supply cooling systems.

The effect of radiation from paper machines, walls, and building elements are discussed together with a method of evaluating a "mean radiant temperature" by means of a special globe thermometer.

High speed fourdriniers operating with elevated water temperatures resulting in high wet end humidities are described with some remedies that can be applied.

Opposing the means to achieve comfort are the factors which keep production or drying capacity high, namely high dryer pressure and temperature together with high ambient air temperatures surrounding the paper machine.

Short of expending exorbitant sums to achieve both a high degree of comfort and high production capacity it is desirable to achieve such operating conditions representing a fairly optimum middle ground that will essentially satisfy the psychological, physiological, and production problems that are involved.

Woodmill Log Handling in the Pulp and Paper Industry on the West Coast —W. H. Rambo and H. A. DeRica, W. H. Rambo, Industrial Plant Engineer

This paper gives and illustrates by means of twenty-eight slides the most modern and up-to-date log handling devices in woodmills on the West Coast.

Illustrated and described are the most modern log hauls, log transfers, roll conveyors, log loading and handling equipment, and band mill installations.

The paper also illustrates and touches on hydraulic barking and chipping of whole logs and small wood handling.

The paper throughout deals with actual, new installations, some of which have never been published before, which are operating profitably every day.

Wood Handling Methods in Pulp Mills of Eastern North Carolina and Virginia —C. L. Wills and C. L. Hildebrand

This paper describes methods of handling and storing pulpwood in pulp mills in Eastern North Carolina and Eastern Virginia, with special emphasis given the modernizing of the wood yard of the authors' company.

The system of storing pulpwood in 5 foot lengths jackstraw style in long piles parallel to a conveyor and handling by crane was decided on in 1946. Previous to this, wood was ranked 8

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feet high all over the yard and moved by trucks and manual labor. A short conveyor for receiving wood from incoming trucks and a parallel rail siding close by delivered wood to the barking drum. Capacity of the system was inadequate and operating cost excessive.

In the modernization, the barking drum and old conveyor were left intact and a new loading conveyor 520 feet long in two flights were built 200 feet away from and parallel to the old, with a 200-foot long transfer conveyor delivering wood from the new loading conveyor to the drum. Two 2-yard crawler cranes with 80-foot beams were purchased, one with an orange peel pulpwood grapple and one with a hook.

Some changes after initial construction were required at the transfer points to eliminate jams.

The storage piles are filled and emptied in rotation which gives a uniform storage period to all wood and makes possible an easy method of taking inventory. Generally, wood received by rail, which is 35% of the total receipts, goes directly into the mill while truck receipts go into storage.

The old wood yard required 1.95 man hours per cord of wood consumed at maximum capacity of 250 cords per day. The new installation requires 0.48 man hours per cord of consumption handling 450 cords per day, and could handle more units with the same man power.

In one mill is a successful installation of log conveyors using rubber covered canvas belts instead of chains. The same mill uses a large gantry crane to unload trucks by sling and reclaim from storage with a grapple. They also receive wood by barges, unloading into conveyors with stationary derricks. At the loading points of the conveyors are special hoppers for feeding the conveyors.

Another mill handling 1500 cords per day has an elaborate sorting table after two barking drums. They use two locomotive cranes for putting wood into and out of storage.

Pneumatic Conveyors in Pulp and Paper Mills—H. A. Stoess, Jr., Fuller Co.

Pneumatic conveyors are used in pulp and paper mills for the conveying of wood chips, and, the unloading from cars to storage bins and reclaiming from storage bins to use bins, of bulk chemicals.

Their advantages include freedom from dust, low handling loss or shrinkage, and, good labor relations, while their disadvantages, although compensative, include higher power cost, higher capital investment and unidirectional. In comparison with other types of conveyors for the same basic requirements, these disadvantages are, for the most part, tenable.

The most common and practical use of a pneumatic conveyor in chip conveying is the transfer of chips from the wood room to the chip loft, or bins, above the digesters.

For the unloading of bulk chemicals, the vacuum type of system is always used. This type of system unloads both hopper bottom and box cars with a minimum of labor and dust loss. The system terminates in a bag type of filter above the storage bin giving a 100% visible retention of dust. For distribution to two or more bins, either gravity spouts, if acceptable or practical, or, mechanical conveyors are used.

For reclaiming, both the vacuum and pressure types of systems are used, with the majority of installations favoring the vacuum type. Certain methods of reclaiming from storage bins are used, with each method being governed by the physical characteristics of each chemical being conveyed.

In recommending pneumatic conveyors, it must be borne in mind, that there is a place for this type, and, a place for other types. The final decision is based upon the economics of the installations, including the amount of labor involved, and, the maintenance to be expected.

AMERICAN PAPER AND PULP ASSOCIATION'S PAPER PRODUCTION RATIO REPORT

(Production as per cent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

		Sept. 8	Sept. 15	Sept. 22	Sept. 29	Oct. 6
	1951	78.7	99.9	99.5	100.3r	101.6
		Sept. 9	Sept. 16	Sept. 23	Sept. 30	Oct. 7
	1950	80.0	103.2	100.1	100.6	99.9

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1950	92.6	95.6	96.7	95.4	98.4	97.7	83.3	99.4	96.1	101.0	99.6	91.2	95.8
1951	99.3	101.3	101.9	102.8	102.5‡	100.2‡	89.4‡	98.9‡	94.8‡				

‡ Preliminary.
r Revised.

COMPARATIVE YEARLY SUMMARIES

	1944	1945	1946	1947	1948	1949	1950	1951
Year to Date	88.2	88.6	100.7	103.7	97.0	86.5	95.4	99.7
Year Average	88.1	89.4	101.1	104.3	96.2	88.6	95.8	

PAPERBOARD OPERATING RATIOS†

		Sept. 8	Sept. 15	Sept. 22	Sept. 29	Oct. 6
	1951	71	94	90	88	
		Sept. 9	Sept. 16	Sept. 23	Sept. 30	Oct. 7
	1950	81	100	101	103	100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Ave.
1950	88	92	91	92	91	94	82	100	96	102	101	93	94
1951	102	105	104	105	104	103	84	94	86				

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

Note: The black line on the chart shows the ratio through December 1950 on the basis of 6-day capacity. Beginning with January 1950 the ratio is shown on the new basis of normal 6 and 7-day capacities by the colored line. Paperboard operating ratios continue on the basis of a 6-day week.

† Per cent of operation based on "inch-hours" reported to the National Paperboard Association.

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O-19

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Production manager wanted for Los Angeles bag and multi-wall bag manufacturer. Age 32-50, married. Salary to $12,000 depending upon background and experience. Handle 50 people. Moving expenses to Los Angeles will be paid. We are retained to help select man for this position. You pay us no fee. Write giving age, education and experience. THE KLEIN INSTITUTE FOR APTITUDE TESTING, INC., DEPT. A, 420 LEXINGTON AVE., NEW YORK 17, N. Y.

O-19

PROJECT ENGINEER with intensive Paper Converting Experience must be aggressive and cost minded. Excellent opportunity for right man. Write full Details. Box #51-538 care Paper Trade Journal.

O-26

WORKING SUPERINTENDENT for small fast growing Eastern mill making lightweight specialties. Cylinder machine experience essential. State qualifications and salary expected. Address Box 51-87 care Paper Trade Journal. TF

EASTERN CONVERTER wants oil-ink Pressman acquainted paper napkin manufacture. Reply in confidence to Box 51-511 care Paper Trade Journal. N-2

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Engineering construction organization with extensive pulp and paper mill projects under way has immediate openings in New York office for paper mill design and layout Engineers. Please give complete engineering and biographical background in first letter. Write Box 51-509 care Paper Trade Journal.

N-2

RESEARCH DIRECTOR

Career opportunity for chemical engineer or chemist to establish and head up research department responsible for product improvement, also new product development, also process development of three paper mills producing kraft and sulphite converted products. Box 51-488 care Paper Trade Journal.

O-19

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A man experienced and fully capable for small, growing Bag Department in Eastern paper mill. Should be experienced in adjusting and production on new Potdevin Notion Bag Machines. A fine opportunity for growth and advancement for the right man. Location is ideal for living and education. Address replies Box 51-491, c/o Paper Trade Journal. O-19

WORKING SUPERINTENDENT—Take charge Converting Dept.—Must be thoroughly experienced maintenance and production napkin folders, roll tissue and towel perforators, towel and toilet interfolders, sheet tissue equipment. References required. Good starting salary, excellent future growing concern. Locate New England. Reply Box 51-506, care Paper Trade Journal. O-19

PERSONNEL SUPERVISOR wanted for Southern Pulp and Paper Mill. Over a thousand employees. Must have required academic background and experience in testing, hiring and general personnel and labor relations. Will, also, have supervision of insurance and safety. Excellent climatic location and opportunity. In replying state complete history and salary required. Reply box 51-533 care Paper Trade Journal.

O-26

WANTED—A Working Master Mechanic with paper mill experience, by a one machine Ohio Paper Board Mill. Give complete resume of experience and salary expected. All replies confidential. Our employees know of this advertisement. Address Box 51-522 care Paper Trade Journal. N-2

HELP WANTED

SALARIED POSITIONS $3,600 to $25,000. We offer the original personal employment service (established 41 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. BIXBY, INC. —117 Dun Bldg., Buffalo, 2, N. Y. TF

WANTED—Master Mechanic or Assistant for modern 3-Machine Tissue Mill. Progressive management; expansion program now under way. Fine opportunity for young/middle aged man to advance. Substantial paper mill mechanical experience with electrical background desirable. Give complete resume of experience in letter to Box 51-443 care Paper Trade Journal. Replies held strictly confidential. TF

WANTED

MECHANICAL ENGINEER for three-machine pulp and paper mill. Fine opportunity for young, aggressive and experienced engineer who can handle Maintenance and his department efficiently. Ideal living conditions for family and education. Address Box 51-498, c/o Paper Trade Journal. O-19

Wanted: Man with experience to carry out effective, intensive, continuous safety program for the Johnsonburg, Pennsylvania Mill (1200 employees) of the New York and Pennsylvania Co., Inc. Prefer person who has had experience as Safety Assistant in larger company with good safety record or as director of effective program in smaller company. O-26

WANTED — SALES ENGINEER — Experienced in Pulp and Paper Mills, for sales and service work in the South. Excellent opportunity with old established machinery manufacturer. In reply give resume of education, experience and current salary. Address Box 51-462 care Paper Trade Journal. N-9

SALES ENGINEER—Engineer with pulp mill experience wanted by well established machinery firm. Opportunity for advancement. Address Box 51-516 care Paper Trade Journal. TF

TOP NOTCH MAN WANTED for research and development work in the field of lacquer coated papers by leading company in its field. Address replies to Research Director, The Plastic Coating Corp., Holyoke, Mass. O-26

SUPERINTENDENT for Maintenance and Modernization; Machine Tender; Back Tenders; for Fine Paper Mill Eastern New York. Address Box 51-501 care Paper Trade Journal. O-26

WANTED — Machine Tenders and Back Tenders for corrugating medium and liner mill, Fourdrinier and cylinder machines. Located in Western Pennsylvania; good working conditions; pleasant surroundings and very good labor relations. Call collect—Tarentum 1470, TARENTUM PRODUCTS CORPORATION, Tarentum, Pa. TF

SITUATIONS WANTED

PLANT MANAGER—Paper and Board and their conversion; wants challenging opportunity. Highly successful in organization; administration; labor relations and high level production. Presently employed. Address Box 51-463 care Paper Trade Journal. O-26

PLANT ENGINEER — Well qualified from experience and education on Power Plant, Maintenance, Modernization and improvements. Address Box 51-530 care Paper Trade Journal. O-19

SITUATIONS WANTED

SUPERINTENDENT — Thoroughly experienced papermaker desires to make new connections. Conventional or Yankee Fourdriniers, light and heavyweight specialties. References. Address Box 51-487 care Paper Trade Journal. O-19

PERSONNEL DIRECTOR—Fifteen years experience Pulp and Paper industry, supervising functions of industrial relations department. Experience includes labor negotiations and contract procedures. Address Box 51-500 care Paper Trade Journal. O-19

BEATER ENGINEER—A very high grade man with a wealth of experience seeks a difficult assignment. Many years with one of America's foremost mills. Expert on colors and knows paper making thoroughly. Address Box 51-525 care Paper Trade Journal. O-26

RESEARCH DIRECTOR in pulp converting, plastic coatings, functional, ordnance industrial papers, tapes, extrusions, 20 years experience, know how ideas and initiative. Patents pending. Address Box 51-532 care Paper Trade Journal. O-19

COLLEGE FORESTRY GRADUATE with 1½ years experience as quality control chemist desires employment in wood department of progressive paper company. Interested in company which can offer advancements as ability is proven. For additional information write Box 51-520 care Paper Trade Journal. O-26

SITUATIONS WANTED

INDUSTRIAL AND CHEMICAL ENGINEER seeks connection with progressive concern considering expansion, research, design or operation. Here or abroad. Sulphate semi-chemical pulps, fine papers, kraft test boards. Just completed two successful plants. Resume of experience and highest references on request. Address Box 51-524 care Paper Trade Journal. O-19

MANAGER OR SUPERINTENDENT desires change. Fifteen years practical experience and five years supervisory capacity. Experienced on Yankee Fourdrinier machines making facial, napkins, toilet tissue and towels. Extensive experience in de-inking and purchase of waste paper. Address Box 51-514 care Paper Trade Journal. O-19

PART TIME on Consulting work sought in Metropolitan Area. Formulation of items in functional, ordnance, industrial, packaging line, tapes, paper, sheeting, cloth, laminates, extrusion. 9 years experience in directing research. Address Box 51-531 care Paper Trade Journal. O-19

PLANT ENGINEER—Facial, Toilet Tissue, Cellulose. Allied converting experience. Seasoned man who can develop systematic maximum production, design new machinery, redesign old equipment. Establish material handling techniques and supervise complete plant maintenance. Address Box 51-539 care Paper Trade Journal. O-26

FOR SALE

FOR SALE

5 Buffalo Stainless Steel Pumps #6 CM.
2 Bird 2A Rotary Screens
1 84" Wet Lap Machine
6 Vibrating Screens
1 Flotation Machine
2 Open Steel Tanks—11' D. x 18' High
10 Glass Lined Tanks
10 3" Redwood and Cypress Tanks
1 5' x 5' Platform Scale
6 Taylor instruments with mercury sticks
1 120 H.P. motor—3/60/440—620 RPM
1 100 H.P. motor—3/60/440—900 RPM
1 Diesel Engine, 500 H.P.—Superior
1 Emerson #2 Jordan

IRWIN COHEN
1251 Somerset Road
West Englewood, N. J.
Tenneck 6-5329 9-26

FOR SALE—64" Seybold Paper Cutter; 56" and 62" Cameron Slitter/Rewinder; 6" Brightwood; Int'nl. Folding Box Gluer; 30" and 44" Hartford Platen Die Cutter; 72" S & S Rotary Slitter/Creaser; Knowlton Spiral Tube Winder & Recutter like new; Complete Set-up Box Machines. Write for listings and prices. Address Box 51-467 care Paper Trade Journal. TF

FOR SALE

1—Sandusky Couch Roll—126" drilled face x 22" diameter.
1—123" 3 bowl revolving reel.

BEARINGS
72—Top and bottom Dryer Bearings 7" diameter x 12" long.

BEATERS
1—Dilts Iron Tub Laboratory Beater. Beater roll 14" diameter x 10½" face.
1—Noble & Wood Cast Iron Beater—1000# capacity—roll newly refilled.

CALENDER STACKS
1—9 roll 68" Calender Stack.
1—3 roll pressure calender—32" x 108".
1—72" 4 roll calender stack. (Extra heavy duty).
1—54" Smoothing Calender Stack, 2 Iron Rolls, 2 Cotton Rolls.
1—60" 3 roll friction calender stack. All iron rolls.

CHESTS
1—Cast Iron Stock Chest, 25' long x 6' high. (With agitator).

CHIPPER
1—60" Murray 4 knife Chipper—anti-friction bearings.

CLASSIFINER
1—Dilts Classifiner, practically new, with motor.

CRUSHER & HAMMERMILL
1—Murray Chip Crusher.
1—Jeffrey Hammermill.

CYLINDER MOLDS
2—30" diameter x 72" face.
1—36" diameter x 78" face.
2—36" diameter x 84" face.
1—36" diameter x 96" face.
1—48" diameter x 72" face.
1—30" diameter x 92" face.
1—38" diameter x 72" face.

DRIVES
1—#4½ Reeves Drive.
1—#4 Reeves Drive
1—Reliance Electric Drive, complete with 5 gear head motors.
1—#3 Reeves Drive (totally enclosed).

DRYERS
1—Complete unit, consisting of 6 dryers, 36" diameter x 38" face, including frames, gears, anti-friction bearings.
7—24" diameter x 48" face.
1—36" diameter x 143" face.
1—48" diameter x 70" face.
1—48" diameter x 120" face, high pressure.
2—Dryers 48" diameter x 134" face.
1—24" diameter x 92½" face.
2—38" diameter x 48" face.
1—84" diameter x 48" face.
1—60" diameter x 68" face.
1—36" diameter x 66" face.
1—20" diameter x 61" face, complete with frames.
8—24" diameter x 60" face.

GUILLOTINE CUTTER
1—60" Cutter.

FLAT SCREENS
1—6 plate Shartle Flat Screen.
2—Packer, 12 plate, roller shoe type.
1—4 plate Sandy Hill (Packer).

JORDANS
1—Herne Jordan.
4—Noble & Wood Mammoth.

LIME SLUDGE FILTERS
3—IMPCO Lime Sludge Filters, vacuum type. 5' diameter x 4' face.

MOTORS
Write us regarding your requirements.

PRESSES
3—Beta Primary Presses, complete, 145" face. Anti-friction bearings. Also all types of rolls for 145" wet end.

PULLEYS
Various cone and assorted pulleys.

PULPERS
1—Jones Pulper. Complete with motor and drive.
1—Noble & Wood Pulper—Iron Tub.
1—Lamson Pulper.

PUMPS
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.
4—Shartle Brothers circulating pumps, each 4,000 g.p.m.

REELS
1—123"—3 bowl Revolving Reel.
1—72" Downingtown Reel, 2 bowl.

REFINERS
2—#1 Claflin Refiners.

ROLLS
Felt, Table, Press, Breast, Couch, etc. Various sizes and types. (Bronze, Rubber, Iron, etc.)

ROTARY SCREENS
1—#2 Bird Rotary Screen.
1—#2A Bird Rotary Screen.

SAVEALLS
1—#5 Bird Saveall.
3—Savealls, 36" diameter x 156" face cylinder molds, iron end vats.

SHEETER
1—65" Clark Sheeter, 8 roll backstand.

SHREDDERS
3—Daniels Rag Cutters.

SLITTERS & WINDERS
1—115" 2 drum Waldron
2—112" Cameron—Type 18.
1—104" Beloit two drum winder.
1—92" Moore & White 6 drum winder.
1—82" Cameron—Type 10-10.
1—62" Cameron—Type 26-3A.
1—50" Langston (Shear cut).
1—52" Cameron—Type 8-5.
1—42" Cameron Constant Tension with pneumatic control.
1—42" Cameron—Type 6.
1—42" Johnstone Slitter.
1—82" Cameron—Type 10.
1—72" Cameron—Type 10.
1—30" Langston.
2—42" Cameron Type 40-1-AF

STOCK PUMPS
1—10 x 20 Shartle Duplex.
1—9 x 16 Shartle Duplex.
2—10 x 10 Beloit Duplex, low type, with motors.
Advise as to your requirements.

SUCTION COUCH ROLL
1—Sandusky Couch Roll 126" drilled face x 22" diameter

SUCTION BOXES
3—130" face Suction Boxes.

THICKENER
1—IMPCO Thickener—Cylinder mold 36 x 78.

TOILET WINDERS
2—72" Hudson-Sharp (Surface type winder).

VACUUM PUMPS
1—N-82 Nash, for Fulton-Midwest System.

WET MACHINE
1—77" Rogers Wet Machine.

YANKEE DRYERS
1—48" Face x 84" Diameter, Frames & Bearings.
1—60" face x 80" diameter including frames and anti-friction bearings.
1—64" face x 80" diameter, including frames and bearings, also 2 dryers 20" diameter x 64" face.

We are always in the market to purchase your surplus or idle machinery. What have you to offer?
Wanted Cylinder and Fourdrinier Machines (complete mills).

Paddy Ross, Pres. **J. J. ROSS COMPANY** Ben Kurz, Treas.
250 Frelinghuysen Ave. Tel.—Bigelow 3-3720 Newark 5, N. J.

FOR SALE

FOR SALE

20 New Anti-friction Bearing Felt Stretches. Brass screws 1¾" dia. complete with hand wheels and ratchet 12 Sets Spring Roll Brackets with 1-7/16" and 1-15/16" bearings.

Osborne Paper Mill Equipment Corp.
FULTON, N. Y. New Tel. #3-4284
O-26

FOR SALE

Two or Three Paper Machines, Cylinder or Fourdrinier, Trim 44", 48" diameter dryers chromium plated. Will rebuild to make any kind of paper and capactiy to meet your needs.
Box 51-505 c/o Paper Trade Journal
TF

FOR SALE

1—138" Fourdrinier Paper Machine with dryers 42" dia., 132" face. Can furnish 13 or 33 dryers to suit your needs. Will rebuild machine to make grades you desire.

Osborne Paper Mill Equipment Corp.
FULTON, N. Y. New Tel. #3-4284
TF

FOR SALE

Used dryers now operating on 40 lbs. steam pressure.

34 dryers—48" x 124"
32 dryers—48" x 118"

Box #51-523 care Paper Trade Journal.
N-30

FOR SALE

1—14' Globe Digester, including drive.

J. J. ROSS COMPANY
250 Frelinghuysen Ave., Newark, 5, N. J.
Tel. Bigelow 3-3720 O-19

FOR SALE

1—84" 9-roll Supercalender Stack. Complete with drives.

J. J. ROSS COMPANY
250 Frelinghuysen Ave., Newark, N. J.
Tel BIgelow 3-3720 O-19

FOR SALE

2—42" Cameron Type 40-1-AF. For adding machine and similar small rolls. 15" diameter rewind and equipped with automatic stop kickoff.

J. J. ROSS COMPANY
250 Frelinghuysen Ave., Newark, 5, N. J.
Tel. Bigelow 3-3720 O-19

FOR SALE—One type I, form K, 50 HP General Electric motor, 440 V, 3 ph, 60 cycle, 900 rpm. Also, one 50" Langston rewinder. Can make rolls up to diameter 40". Address Box 51-506 care Paper Trade Journal.
O-26

FOR SALE

FOR SALE

Complete Yankee Fourdrinier now operating at 870: Dryer 8' diameter, 70½" face. Dryer hood and heater exhaust, reel, winder, collating and slitter equipment included. Wrieger roll equipped. Suitable for making facial, wadding, toilet, towel and Kraft specialties.
Address Box 51-527 care Paper Trade Journal. O-19

PAPER COATING MACHINERY MANUFACTURERS — Waxing, Oiling, Carbon Laboratory Coating and Treating and Flat Ream Measuring and Converting Machines. New improvement. THE MAYER MACHINE COMPANY, INC., 1313 Buffalo Road, Rochester, 11, N. Y. TF

FOR SALE—32" Cameron type 8 Model 5 Slitter; 48"Kidder Model CH shear cut slitter; 36" Cameron Rewinder; 71" Moore & White Upright 2 drum Reel; 42" Moore & White Sheeter; 100" Dilton Sheeter. Thomas W. Hall Company, Inc., 120 West 42nd St., New York, 18. TF

ONE AW-2 HUDSON SHARP WAXER. Takes 30" wide web. Complete with wax cooling unit, rewinder and slitter attachment and parent roll stand. Extra rubber roll. New condition. Address Box 51-529 care Paper Trade Journal. N-9

FOR SALE—One 200 HP G. E. Motor—Type I, Form K Frame, 17, Ser. 4025617, 3/60/440/600 RPM with Std. shaft extension; 2 extra dippings for moisture proofing. Never used since rebuilt. Sangamon Paper Mills Inc., 137 W. Pershing Rd., Chicago, Ill. O-26

WANTED

Wanted, 130 tons Side Rolls Standard 32 lb. Newsprint, jumbo diameter any width up to 72", RESOLUTE PAPER PRODUCTS CORP., 250 West 57th St., New York 19, N. Y. CO-5-6315.

O-19

WANTED

WANTED

Tablet Paper—16 lb.
34" Rolls
Any Quantity
Address Box 51-536 care Paper Trade Journal.
N-2

WANTED—W & P Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic presses, Sheridan Presses, Dryers. Address Box 51-89 care Paper Trade Journal. TF

WANTED—Brightwood Box Machine, Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic presses, Sheridan Presses, Dryers. Address Box 51-88 care Paper Trade Journal. TF

WANTED—One No. 6 Bird Save-All or equivalent equipment. MUSKINGUM FIBER PRODUCTS CO., Box 419, Coshocton, Ohio. O-19

WANTED—Roll Grinder to make 30" diameter rolls, 200" face, with crowning device. Also, Number 7 or L.P. Nash Pump. Address Box 51-508 care Paper Trade Journal. O-19

WANTED TO BUY OR LEASE—Fourdrinier or Cylinder mill with one or two machines. Confidential. Address Box 51-526 care Paper Trade Journal. O-26

WANTED—10", 13" and 17" Napkin Printers or Machines. Full details to Box 51-512 care Paper Trade Journal. N-2

WANTED—15 Dryers 70-74" face, 36" diameter. Address Box 51-519 care Paper Trade Journal. N-2

WANTED—Double Cutoff 84" wide. Address Box 51-537 care Paper Trade Journal. O-19

WANTED—Four Fourdrinier Machines, 3 wide, 1 to trime 100". Will consider complete machine or offer components. Address Box 51-535 care Paper Trade Journal. N-9

WANTED—Bundling Press for pressure Packing Paper Bags. Size range 6¼ x 9¼ to 17 x 21. Address Box 51-528 care Paper Trade Journal. O-19

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BUY — BARTER — SELL

Phenol—Phthalic—Maleic—Glycols
Titaniums — Zinc Oxides — Hydrosulfite — Bichromates — Ethanolamines—Pine Oil—Benzol—Dyes—Colors, etc.

CHEMICAL SERVICE CORPORATION
86-04 Beaver St., New York 5, N. Y.
O-19

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CALENDER & EMBOSSING ROLLS
BUILT - REBUILT - RECONDITIONED

Building the finest calender and embossing rolls to your specifications is a Wheeler specialty—backed by 20 years experience. Calender and embossing rolls up to 240 inches built or reconditioned. Complete technical department at your service.

THE WHEELER ROLL CO.
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VERSATILE

is the word for

GLIDDEN ALPHA* PROTEIN

Have you discovered this Pure Soya Protein that does so *many* jobs better in the paper industry?

Glidden Alpha* Protein was the first pure protein chemically isolated from the soybean ever to be produced on a commercial scale for industrial use. Today, in the paper industry alone, it is performing a variety of important jobs *better*—often more economically, too.

As an adhesive for pigments used in coating printing papers, Alpha* Protein is stable in solution over a wide range. It is compatible with the various types of pigments and binds them to the fibre of the raw stock easily. It does not affect, to any extent, the brightness or hiding power of pigments used. Alkaline-cut Alpha* Protein adhesive permits addition of formaldehyde to coating colors to make the finished paper water-resistant. And many other advantages have made Alpha* Protein a truly superior adhesive for paper coating!

In beater sizing, Alpha* Protein is a primary ingredient in the patented Glidden Prosize Process which users have reported gives six big advantages, including greater sizing efficiency at lower cost. In tub and calender sizing and in laminating, Alpha* Protein has demonstrated properties which have made it the choice of numerous mills. In the coating and printing of wallpaper—especially the washable type, in the coating of insulation board and in many other uses, Alpha* Protein has proved itself a valuable material.

Write for additional information on this versatile soya protein material—and its possible application to your product or process. A representative of the Glidden Technical Service will call if you wish.

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SOYA PRODUCTS DIVISION
1823 N. Laramie Avenue
Chicago 39, Illinois

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WHERE TO BUY

ABRASIVES
Monsanto Chemical Co.
Naugatuck Chemical Division of U. S. Rubber Co.
Norton Co.
Simonds Abrasive Co.

ADHESIVES
American Cyanamid Company Plastics & Resins Division
Diamond Alkali Co.
The Dow Chemical Co.
E. I. du Pont de Nemours & Co., Inc.
The Goodyear Tire & Rubber Company
Monsanto Chemical Co.
Morningstar, Nichol, Inc.
National Starch Products, Inc.
Nopco Chemical Co.
Plaskon Division, Libbey-Owens-Ford Glass Co.
Reichhold Chemicals, Inc.
Stein, Hall & Co., Inc.

ADJUSTABLE SHAKE MOTION
Manchester Machine Co.
Rice Barton Corporation

ADJUSTABLE TILTING MOTOR BASE
Lovejoy Flexible Coupling Co.

AGITATORS
American Paper Machy & Engrg. Works, Inc.
Appleton Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
D. J. Murray Mfg. Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.
Shartle Brothers Machine Co.

ALLOYS
Michigan Steel Casting Co.

ANTIFOAM
American Cyanamid Company Industrial Chemicals Division
National Aluminate Corp.
Nopco Chemical Co.

APRON CLOTH
Williams-Gray Co.

BAG MACHINES
Dilts Machine Works
Potdevin Machine Co.
H. G. Weber & Co., Inc.

BALL MILLS
F. L. Smidth & Co.

BARK BURNER
Combustion Engineering-Superheater, Inc.
Hofft Company, Inc.
Nichols Engrg. & Research Corp.

BARK PRESS
Fibre Making Processes, Inc.

BARKERS AND CHIPPERS
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Carthage Machine Co.
Fibre Making Processes, Inc.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

BARS
Dilts Machine Works
E. D. Jones & Sons Co.
The Moore & White Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

BASIC WEIGHT SCALES
Thwing-Albert Instrument Co.

BEARINGS
The Bagley & Sewall Company
Black Clawson Company
E. D. Jones & Sons Co.
Magnus Metal Corp.
The Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
SKF Industries
Stephens-Adamson Mfg. Co.
Timken Roller Bearing Co.
Valley Iron Works Co.

BEATERS AND JORDANS
American Paper Machy. & Engrg. Works, Inc.
The Appleton Machine Co.
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Morden Machines Co.
J. J. Ross Company
Ross Paper Machy. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

BED PLATES
Bahr Brothers Mfg. Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Lukenweld Div., Lukens Steel Co.
Rice Barton Corporation
Shartle Brothers Machine Co.
Valley Iron Works Co.

BELTING
Alexander Bros. Belting Co.
Allis-Chalmers Mfg. Co.
Goodrich, B. F., Co.
The Goodyear Tire & Rubber Company
Link Belt Company

BIN DISCHARGERS
Hofft Company, Inc.
Stephens-Adamson Mfg. Co.

BINS, STORAGE
The Marietta Concrete Corp.

BLEACHING AGENTS
E. I. du Pont de Nemours & Co., Inc.
General Dyestuff Corp.
Rohm & Haas Co.
Virginia Smelting Co.

BLEACHING APPARATUS
E. D. Jones & Sons Co.
Perkins & Sons, Inc., B. F.
Moore & White Co.
Niagara Alkali Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

BLOW PIPES & PITS
Carthage Machine Co.
Kalamazoo Tank & Silo Co.
Moore & White Co.
Murray Mfg. Co., D. J.
Walworth Company

BOILERS
Babcock & Wilcox Co.
Combustion Engineering-Superheater, Inc.

BOTTOMS
Kalamazoo Tank & Silo Co.
Valley Iron Works Co.

BOXBOARD SCALES
Thwing-Albert Instrument Co.

BRUSH ROLLS
M. W. Jenkins Sons, Inc.
Gus Reidel & Son

BRUSHES
M. W. Jenkins Sons, Inc.
Gus Reidel & Son
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.

BURSTING TESTERS
B. F. Perkins & Son Inc.
Testing Machines, Inc.

CALENDERS
The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
Lobdell United Co.
Edward J. McBride
The Moore & White Co.
Perkins & Sons, Inc., B. F.
Rice Barton Corporation
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

CARRIER ROPE
Williams-Gray Co.

CASEIN
American Cyanamid Co. Industrial Chem. Div.
Bunge Pulp & Paper Co.
Hercules Powder Co.

CASTINGS
Appleton Machine Co.
The Bagley & Sewall Company
Black Clawson Company
Babcock & Wilcox Co.
Carthage Machine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Hamblett Machine Co.
Lobdell United Co.
Magnus Metal Corp.
Michigan Steel Casting Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Walworth Company

CENTRIFUGAL MACHINERY
Bird Machine Co.

Nichols Engrg. & Research Corp.
Rose, J. O., Engrg. Co.
Shartle Brothers Machine Co.

CHAINS
Jeffrey Mfg. Co.
Stephens-Adamson Mfg. Co.

CHEMICAL COTTON PULP
Hercules Powder Co.

CHEMICALS
American Cyanamid Co., Industrial Chem. Div.
Ansul Chemical Co.
Bauge Pulp & Paper Co.
Calco Chemical Co.
Calgon, Inc.
Diamond Alkali Co.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuffs Corp.
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Hercules Powder Co.
Hooker Electrochemical Co.
The Kinsley Chemical Company
Monsanto Chemical Company
National Aluminate Corp.
Naugatuck Chemical Division of U. S. Rubber Co.
Niagara Alkali Company
Nopco Chemical Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Virginia Smelting Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

CHESTS
The Bagley & Sewall Company
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
Shartle Bros. Mch. Co.

CHIP PACKERS
Fibre Making Processes, Inc.

CLEANING MATERIALS
American Cyanamid Company Industrial Chemicals Division
Diamond Alkali Co.
The Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuff Corp.
Monsanto Chemical Company
Nopco Chemical Co.
Pittsburgh Plate Glass Co.
Wyandotte Chemicals Corp., J. B. Ford Division

CLUTCHES
Appleton Machine Co.
The Bagley & Sewall Company
Black Clawson Company
Farrel-Birmingham Co.
Hudson-Sharp Mch. Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.

COATING MACHINERY
Dilts Machine Works
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
The Mayer Machine Co., Inc.
Moore & White Co.
Potdevin Machine Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corporation, John
Weber, Herman G., & Co., Inc.

COATING MATERIALS
American Cyanamid Company Industrial Chemicals Division
The Dow Chemical Co.
E. I. du Pont de Nemours & Co., Inc.
B. F. Goodrich Chemical Co.
The Goodyear Tire & Rubber Company
Hercules Powder Co.
J. M. Huber Corp.
Monsanto Chemical Company
Naugatuck Chemical Division of U. S. Rubber Co.
Nopco Chemical Co.
Plaskon Division, Libbey-Owens-Ford Glass Co.
Reichhold Chemicals, Inc.
Wyandotte Chemicals Corp., Michigan Alkali Div.

COILS
The N. P. Bowsher Co.

COMPLETE FOURDRINIER ROLL GRINDING
Manchester Machine Co.

COMPRESSORS
Allis-Chalmers Mfg. Co.
Nash Engineering Co.
Roots-Connersville Blower Corp.

CONDENSATE FILTERS
Hungerford & Terry, Inc.
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CONDENSERS
Fibre Making Processes, Inc.

CONSISTENCY REGULATORS
Askania Regulator Co.
Bird Machine Company
DeZurik Shower Company
Paper & Industrial Appliances

CONSTRUCTION CONTRACTORS
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Main, Inc., Chas. T.
The Rust Engrg. Co.
Shartle Bros. Mch. Co.
J. E. Sirrine & Co.
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John Waldron Corp.
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CONTROLS
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Poirier Control Co.
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Stickle Steam Specialties Co.

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Egan, Frank W., & Co.
John Waldron Corp.
Dilts Machine Works

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Rose Engineering Corp., J. O.
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Stephens-Adamson Mfg. Co.

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Smith & Winchester Mfg. Co.
Sonoco Products Co.

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Alpha Cellulose Corp.
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COTTON PULP
Alpha Cellulose Corp.

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Beloit Iron Works

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Black Clawson Company
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E. D. Jones & Sons Co.
Lovejoy Flexible Coupling Co.
Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John

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Cleveland Crane & Engrg. Co.
Whiting Corp.

CURL TESTER
Thwing-Albert Instrument Co.

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Beloit Iron Works
Black Clawson Company
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Jagenberg-Werke Akt. Ges.
Moore & White Co.
Perkins & Son, Inc., B. F.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
The Smith & Winchester Mfg. Co.
Taylor, Stiles & Co.

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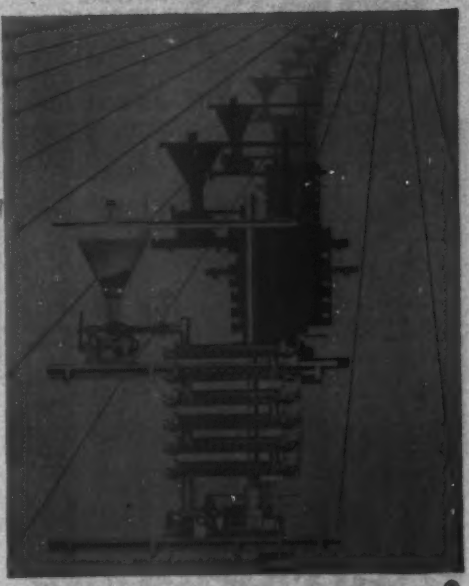

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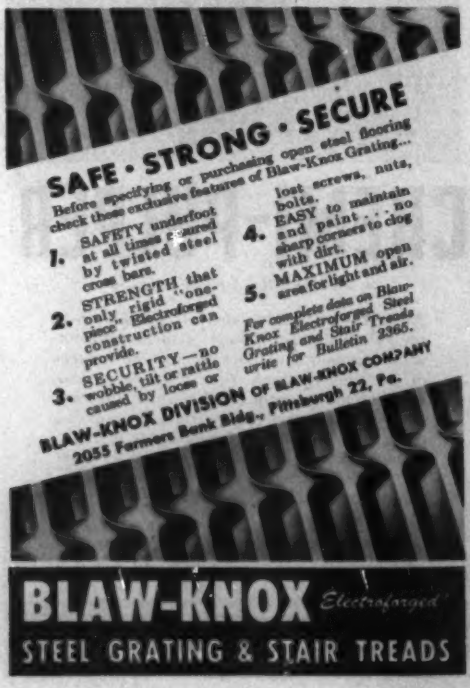
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General Dyestuff Corp.
Kinsley Chemical Co.
Nopco Chemical Co.

DE-MINERALIZING EQUIPMENT
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The Permutit Company

DEMULSIFIERS
Wyandotte Chemicals Corp., Michigan Alkali Div.

DENSOMETERS
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W. & L. E. Gurley

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Ebasco Services

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Diamond Alkali Co.
General Dyestuff Corp.
Monsanto Chemical Company
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

DEWAXING CHEMICALS
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General Dyestuff Corp.
Nopco Chemical Co.

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Blaw Knox Company
Chicago Bridge & Iron Co.
Combustion Engineering-Superheater, Inc.
Lukenweld
Paper & Industrial Appliances
Pusey & Jones Corp.

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National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

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Lodding Engineering Corp.
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Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

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Bird Machine Company
Lodding Engrg. Corp.
The Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Simonds Saw & Steel Co.

DRIERS
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Black Clawson Company
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The Moore & White Co.
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J. J. Rose Company
Red-Ray Mfg. Co., Inc.
Rice Barton Corporation
Rose Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

DRILLED SUCTION COUCH ROLLS
Manchester Machine Co.

DRILLED SUCTION DRUM ROLLS
Manchester Machine Co.

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Appleton Machine Co.
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Beloit Iron Works
Bird Machine Co.
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Fairbanks, Morse & Co.
Farrel-Birmingham Co.
Jeffrey Mfg. Co.
General Electric Company
Gibbs-Brower Company, Inc.
Moore & White Co.
Murray, D. J., Mfg. Co.
Pusey & Jones Corp.
Rice Barton Corporation
J. J. Rose Company
Rose Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

DRUM WINDERS
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Rice Barton Corporation

DRYER DRAINAGE
Stickle Steam Specialties Co.

DRYER ROLL PYROMETER
Thwing-Albert Instrument Co.

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Downingtown Mfg. Co.
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M. W. Jenkins Sons, Inc.
E. D. Jones & Son Co.
Moore & White Co.
D. J. Murray Mfg. Co.
John Waldron Corp.

DUSTING BRUSHES
M. W. Jenkins Sons, Inc.

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Bunge Pulp & Paper Co.
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
National Aniline Division, Allied Chemical & Dye Corp.

ELECTRIC HYGROMETER
Thwing-Albert Instrument Co.

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Egan, Frank W., & Co.
John Waldron Corp.

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Gibbs-Brower Company, Inc.
Holyoke Machine Co.
Northern Engraving & Mch. Co.
B. F. Perkins & Son, Inc.
John Waldron Corp.
Wheeler Roll Co.

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Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp.

ENZYMES
Rohm & Haas Co.
Vanderbilt Co., R. T.

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Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

EXPANDERS
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FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

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Merrick Scale Mfg. Co.
The Permutit Company
Stephens-Adamson Mfg. Co.

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Asten-Hill Mfg. Co.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Morey Paper Mill Supply Co.
Albert & Bennington
Waterbury Felt Co.
Waterbury, H., & Sons Co.
Williams-Gray Co.

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Calgon, Inc.
General Dyestuff Corp.
Nopco Chemical Co.

FELT CONDITIONERS
Bird Machine Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works

FELT GUIDES
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Frank W. Egan & Co.
Gilbert & Nash Co.

Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

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Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

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Holyoke Machine Co.
J. M. Huber Corp.
Hungerford & Terry, Inc.
Johnson Corp.
Moore & White Co.
J. O. Ross Engrg. Corp.
The Sandy Hill Iron & Brass Works
Walworth Company

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Crane Company
Shartle Bros. Mch. Co.
Walworth Company

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Lellrey Mfg. Co.
Lovejoy Flexible Coupling Co.
John Waldron Corp.

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Norton Co.

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Rice Barton Corporation
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Towmoter Corp.

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Williams Apparatus Co., Inc.

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Downingtown Mfg. Co.
The Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

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Williams Apparatus Co.

FURNACES
Hefft Company, Inc.

GASKETS
The Goodyear Tire & Rubber Company

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Black Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Rice Barton Corporation
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Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Stroh Process Steel Co.
Valley Iron Works Co.
Westinghouse Electric Corp.
Western Gear Works

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Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell United Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

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Norton Company
Simonds Abrasive Co.

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Gilbert & Nash Co.
The Moore & White Co.
Mount Hope Machinery Co.
Rice Barton Corporation
John Waldron Corp.

GUMMING MACHINES
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Egan, Frank W., & Co.
The Sandy Hill Iron & Brass Works

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Stein-Hall Co., Inc.

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Westinghouse Electric Corp.

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General Electric Co.
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Red-Ray Mfg. Co., Inc.
Ross Engineering Corp., J. O.
Stickle Steam Specialties Co.
Valley Iron Works Co.

HOSE (Air, Water, Suction, etc.)
The Goodyear Tire & Rubber Company

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Aktivin Division, Heyden Chemical Corp.
Nopco Chemical Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

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B. F. Goodrich Chemical Co.

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Dilts Machine Works

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Townsotor Corp.

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Taylor Instrument Cos.
Testing Machines, Inc.
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Williams Apparatus Co.

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Beloit Iron Works
Johnson Corp.
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Shartle Bros. Mch. Co.

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Baker Brothers Mfg. Co.
E. D. Jones & Sons Co.
Shartle Bros. Mch. Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

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Hamblet Machine Co.
Heppenstall Company
E. D. Jones & Sons Co.
The Moore & White Co.
Simonds Saw & Steel Co.
Taylor Stiles & Co.
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Egan, Frank W., & Co.
E. D. Jones & Sons Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works Co.
John Waldron Corp.
Williams Apparatus Co., Inc.

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Dilts Machine Works
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Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.
The Wellman Engrg. Co.

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Struk Process Steel Co.

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Lobdell Co.
Stephens-Adamson Mfg. Co.
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Bunge Pulp & Paper Co.
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Stickle Steam Specialties Co.
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Manchester Machine Co.
Rice Barton Corporation

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Bagley & Sewall Co.
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Moore & White Co.
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Valley Iron Works Co.

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Jagenberg-Werke Akt. Ges.
Langston Co., Samuel M.

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Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

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Crane Company
Grinnell Company
Michigan Steel Casting Co.
National Tube Co.
Walworth Company

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Armco Drainage & Metal Products, Inc.
Crane Company
Grinnell Company
Michigan Steel Casting Co.
Walworth Co.

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Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Co.

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B. F. Goodrich Chemical Co.
Naugatuck Chemical Division of U. S. Rubber Co.
Nopco Chemical Co.

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Perkins & Son, Inc., B. F.

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Babcock & Wilcox Co.
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Lakenweld Division
Lukens Steel Company
Timken Roller Bearing Co.

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Black Clawson Company
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.

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Manchester Machine Co.
Rice Barton Corporation

PRECISION SAMPLE CUTTER
Testing Machines, Inc.
Thwing-Albert Instrument Co.

PRESERVATIVES
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General Dyestuff Corp.

PRESS ROLLS
Beloit Iron Works
Rice Barton Corporation

PRESSURE FILTERS
Holyoke Machine Co.

PRESSURE VESSELS
Chicago Bridge & Iron Co.
Combustion Engineering-Superheater, Inc.

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Black Clawson Company
Dietz Machine Works
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson-Sharp Mch. Co.
The Moore & White Co.
Potdevin Machine Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.
Waldron Corp., John
H. G. Weber & Co., Inc.
Williams Apparatus Co.

PULLEY
Lovejoy Flexible Coupling Co.
Rice Barton Corporation

PULP CLASSIFIER
The Bauer Bros. Co.
Thwing-Albert Instrument Co.

PULP CLEANERS
Nichols Engrg. & Research Corp.

PULP STOCK VALVES
Crane Company

Beloit Fdy. & Mach. Co.
Shartle Brothers Machine Co.

PULPERS
Ajamax, Inc.
Bauer Brothers Co.
Dilts Machine Works
E. D. Jones & Sons Co.
Morden Machines Co.
Shartle Brothers Machine Co.

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Brown Company
Bunge Pulp & Paper Co.
Gottesman & Co., Inc.
Lyddon & Co. (Americas), Inc.
Parsons & Whittemore, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.
Restigouche Co., Ltd.

PULPSTONES
Norton Company

PULP TESTERS
Paper and Pulp Testing Laboratories
Williams Apparatus Co., Inc.

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Jeffrey Mfg. Co.
F. L. Smith & Co.

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The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Buffalo Pumps, Inc.
Byron Jackson Co.
DeLaval Steam Turbine Co.
Downingtown Mfg. Co.
Fairbanks, Morse & Co.
Gibbs-Brower Company, Inc.
Johnson Corp.
Moore & White Co.
Nash Engineering Co.
Roots Connersville Blower Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

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General Dyestuff Corp.
Rohm & Haas Co.

RAG CUTTERS
Gibbs-Brower Company, Inc.
B. F. Perkins & Son, Inc.
Taylor-Stiles & Co.

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Chicago Bridge & Iron Co.
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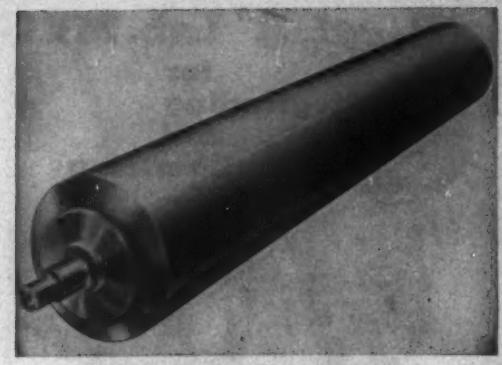

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Bruce E. Brown — George Heitzberg — R. K. Vinton

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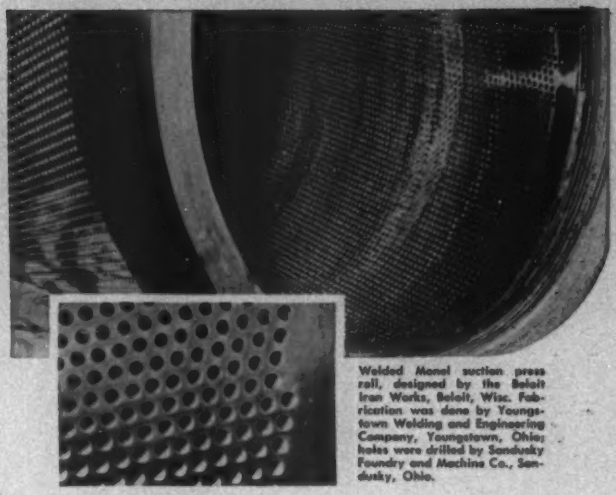
HUGHES PRINTING CO. EAST STROUDSBURG, PA.

Over two years without down-time on press rolls!



Welded Monel suction press roll, designed by the Beloit Iron Works, Beloit, Wisc. Fabrication was done by Youngstown Welding and Engineering Company, Youngstown, Ohio; holes were drilled by Sandusky Foundry and Machine Co., Sandusky, Ohio.

Monel suction press rolls eliminate rubber covers . . . minimize clogged holes

There's less maintenance work at a large eastern paper mill these days.

The story starts a little over two and a half years ago when the company made a replacement. For one of their regular cast suction press rolls they substituted one of welded Monel®.

Months passed! Long after the usual time for cleaning and resurfacing, the Monel roll was still in A-1 condition. ***Naturally,*** when the time came to order another machine, engineers specified a Monel roll.

Today, both rolls are in the same condition as when first installed. ***And they have not required a single down-time for maintenance!*** What's more, there has been no loss of felt life!

Here's why Monel has "made-to-order" properties for suction press rolls:

It is hard and highly resistant to corrosion. Therefore, the rolls have remained smooth without refinishing — ***even without using rubber covers when operating on high speed machines.***

And, the high "wettability" of Monel, combined with its satin-finish smoothness, permits easy flow of the stray pulp fibres through the suction holes without clogging.

The former cast rolls were 1⅝" wall thickness and the Monel rolls were made to the same specifications. However, they proved so much stronger that future wrought Monel rolls will have thinner walls. Thus, the rolls will be lighter and easier to handle.

Due to the increased diversion of the INCO Nickel Alloys to the defense program, civilian supplies are limited. But, even if you find you must wait for these metals, keep in mind their advantages in paper mill applications. For more specific information on how to solve ***your*** metal problems, just write, giving complete details.

EMBLEM OF SERVICE
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THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

MONEL ***. . . for Minimum Maintenance***

"Weld" Isn't the Password for Corrosion Here

Weld areas in stainless steel linings of digesters are sometimes subject to costly intergranular corrosion. But not here! This digester lining is made of Armco Type 316 ELC Stainless Steel—a special grade that won't let welding heat bring on corrosion.

This is why: Carbon content of Armco Extra-Low Carbon Stainless Steels is only .03% maximum. This eliminates the danger of corrosion alongside weld areas when it is due to the heat effects of welding.

Heretofore, this kind of corrosion was prevented by adding columbium to the stainless as a stabilizer. But this is not necessary with Armco Type 304 ELC and Type 316 ELC Stainless. They do the same job as the corresponding stabilized grades at *less cost.*

VARIETY OF USES

Paper and pulp mills are finding Armco ELC Grades do a top-notch job in digesters, blow-pit bottoms and target plates, inlet manifolds, screen plates, paper machines and other equipment exposed to corrosion at temperatures up to 800 F.

For help in specifying or maintaining stainless steel equipment, write for your copy of "A Stainless Profit Story." This booklet is based on data compiled from tests in pulp and paper mills all over the country.

WHAT TESTS SHOW

The welded specimens at right were exposed to a nitric-hydrofluoric acid etch test.

REGULAR TYPE 304. Dark lines on this welded specimen show where intergranular corrosion, caused by carbide precipitation, took place.

ARMCO TYPE 304 ELC. There is no evidence of attack by corrosion on this welded stainless specimen. Extremely low carbon content is the reason.

ARMCO STEEL CORPORATION

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